the OIL AND GAS JOURNAL

FRANKS MFG. CORP. WELL SERVICING AND DRILLING UNITS HAS IT!

The Finest SKID WINCH Available

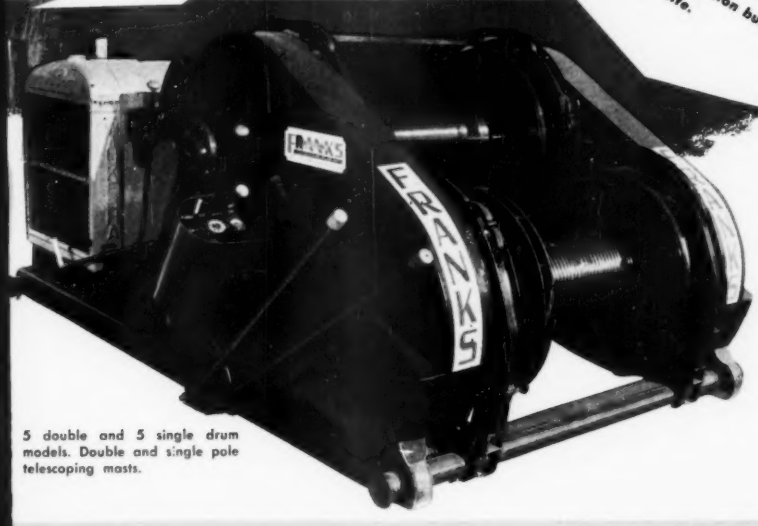
Friction Drum Clutches. Air actuated. Sealed against oil and grease. Greater capacities. One-point hydraulic adjustment.

Larger capacity brakes. Hydraulically adjusted and equalized from one point. Less wear and maintenance.

Easier, safer operation. "Feel-in" finger-tip air controls with all operations at one position.

Greater adaptability to your requirements. Available with oil-field engines, torque converters, transmissions and rotary drives.

Less weight at lower cost. Compact and easy to move. Precision built for long life.



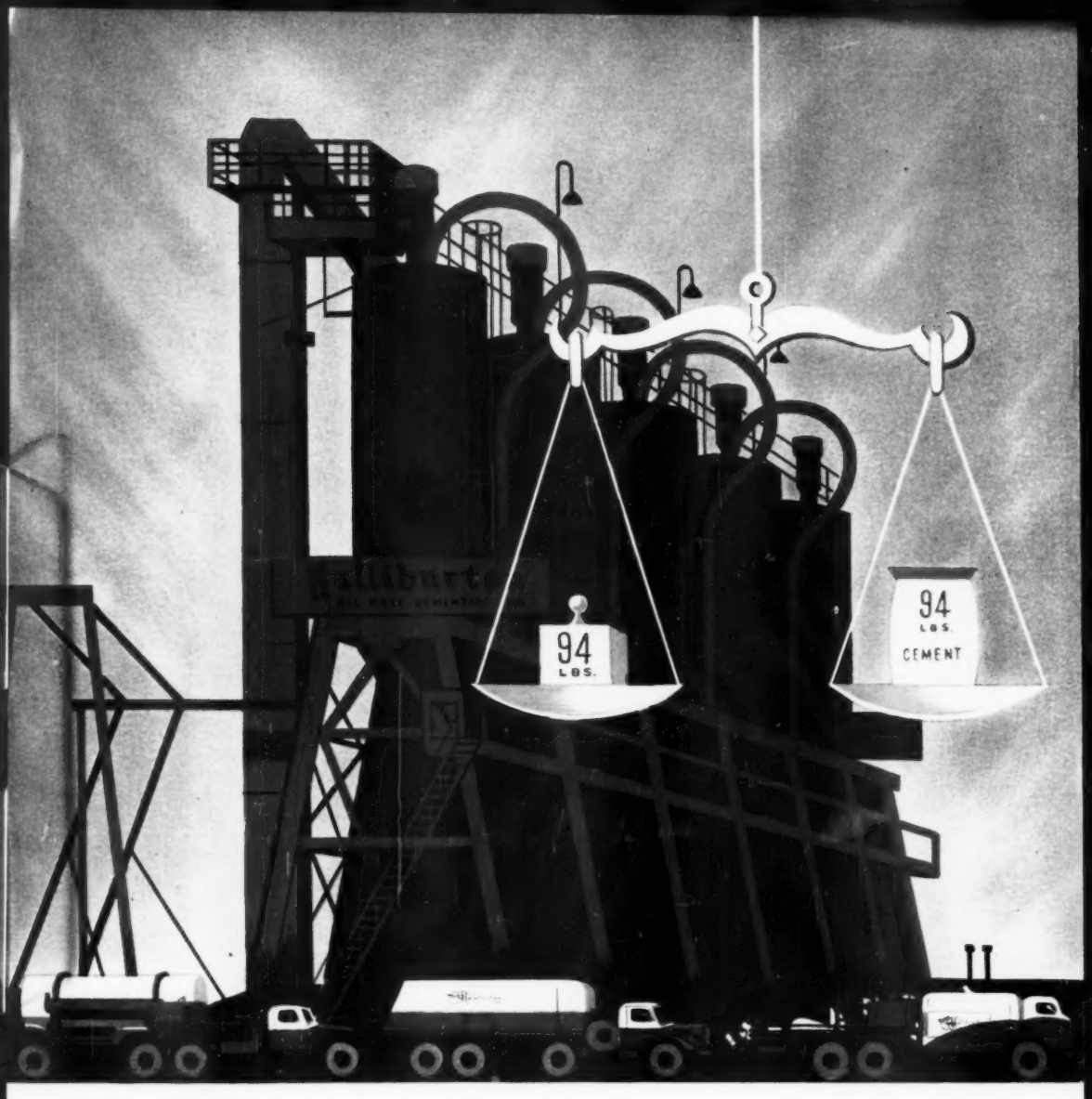
5 double and 5 single drum models. Double and single pole telescoping masts.

FRANKS, the leading manufacturer of self-propelled well servicing units, now offer you their 1950 model skid winches. All the famous improved features which have made the self-propelled units superior are contained in the 1950 model skid winches. Compare Franks and you'll select Franks skid winches as a better buy.

FRANKS MFG. CORP. WELL SERVICING AND DRILLING UNITS

TULSA, OKLAHOMA

PRICE 50 CENTS TABLE OF CONTENTS PAGE 17 FEBRUARY 2, 1950



62 MILLION SACKS OF BULK CEMENTING EXPERIENCE

HOWCO BULK CEMENTING

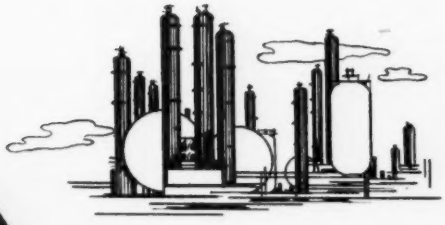
No cement is lost or wasted when HOWCO Bulk Cementing Service is employed. Specified weight in every sack is used. Over 62,000,000 sacks of cement, used with expert application of HOWCO equipment and techniques, prove every feature of this economical, advantageous service. Weighed in the scales of efficiency, economy and results, HOWCO has provided balanced operations for a decade. Successful operators in active oil fields the world over depend on HOWCO for expediting production. This service . . . combined with related HOWCO services and equipment . . . built the tradition of economy and efficiency associated with the famous Halliburton name.

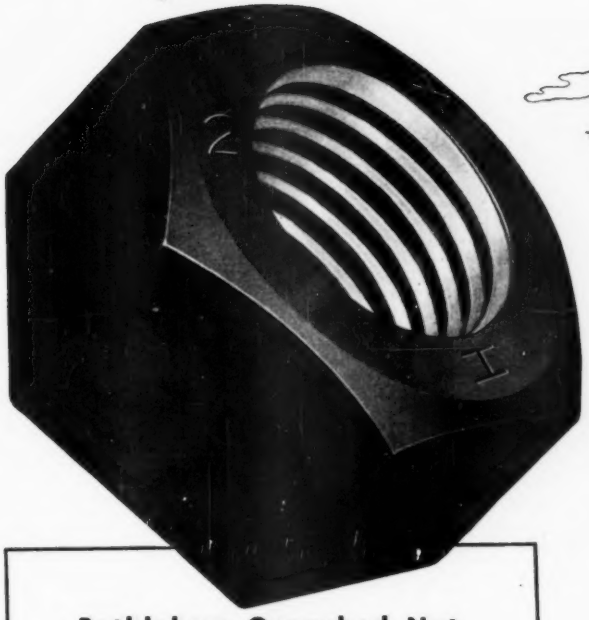
There is no substitute for experience in oil well cementing

HALLIBURTON OIL WELL CEMENTING COMPANY

DUNCAN, OKLAHOMA

Pays its own way





Bethlehem Quenched Nut

Grade 2H, Size Range: ⅜ in. to 3½ in.

CHEMICAL COMPOSITION

CARBON	0.40 MIN
PHOSPHORUS	0.05
SULPHUR	0.05

HARDNESS REQUIREMENTS

BRINELL	248 TO 352
ROCKWELL C	24 TO 37

The Bethlehem Quenched Nut has the built-in strength required in high-temperature, high-pressure bolting jobs. It pays its own way by giving top performance day after day.

The Bethlehem Quenched Nut is ideal for strenuous bolting applications because it is hot-forged. It is not punched from a hot bar, but is actually formed by forging and extruding hot metal into a forming die.

This results in a nut with a highly-refined, tough grain structure—a nut sufficiently strong to break *any* stud or bolt on which it is used. It has untrimmed, oxidized sides which are resistant to corrosion, and its ground bearing surface is definitely superior to common, machined surfaces.

The Bethlehem Quenched Nut conforms in every respect to Grade 2H of ASTM Specification A194. In addition to Grade 2H, Bethlehem also stocks nuts in Grades 0, 1, 2 and 4. The nearest Bethlehem representative is at your service.

BETHLEHEM STEEL

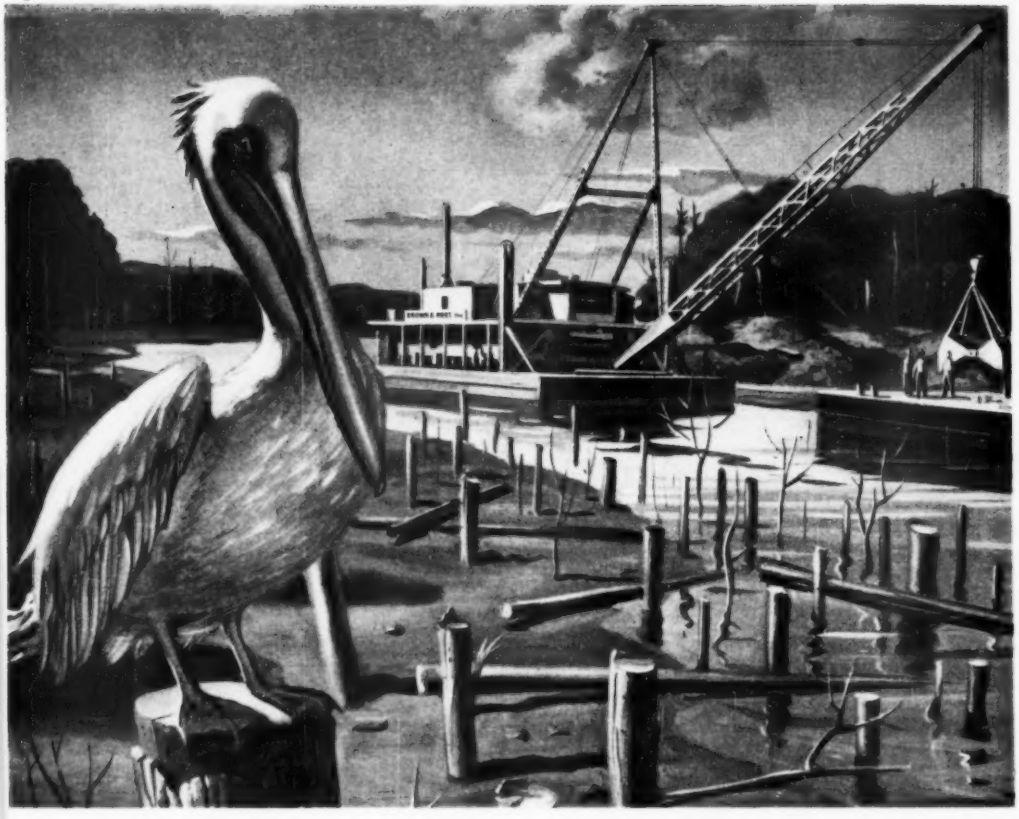
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

Export Distributor: Bethlehem Steel Export Corporation

Bethlehem supplies every type of Fastening

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1950.



SPECIALISTS
IN *Southwest*
CONSTRUCTION

If you are one of the many planning an industrial project in the booming Southwest, here is a fact worth remembering: building conditions in the Southwest are unique; ***factors such as soil, climate, and terrain are unlike those found anywhere else in the country!***

Make no mistake about it: building under these conditions requires ***experience . . . Southwest experience!***

Brown & Root, Inc., is the recognized construction leader in this area. Its thirty years' experience encompasses every phase of industrial construction in the Southwest.

If you have Southwestern plans, this experience will prove invaluable to you!

BROWN-BILT

BROWN & ROOT, Inc. *Engineers & Constructors*

P. O. BOX 3, HOUSTON 1, TEXAS

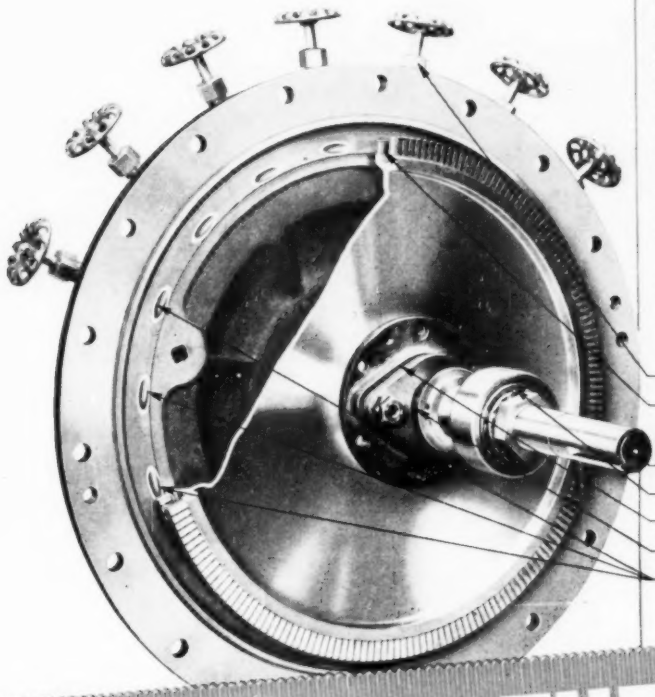
CABLE ADDRESS — BROWNBILT

Associate Companies — BROWN ENGINEERING CORP. • BROWN & ROOT MARINE OPERATORS INC.

No other steam turbine offers you

SUCH VERSATILE STEAM NOZZLE CONTROL

The larger number of hand valves you see on a Coppus Steam Turbine promises you greater operating economy. At least 60% of the steam nozzles can be individually controlled to give maximum steam pressure in steam chest . . . a guarantee of best water rates at any load. Maintenance economy, too, is assured by the hard chromium plating of the shaft at the stuffing box. It provides the best possible smooth, non-corrosive surface for packing rings.



7 hand valves for efficient partial load operation, (20" turbine shown)

2 row velocity-stage turbine wheel with stainless steel turbine buckets — statically and dynamically balanced

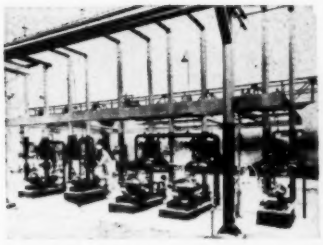
30-40 carbon steel shaft

Oversized double row deep grooved ball bearing

Stuffing box with metallic packing ring

Heavy chrome plating of shaft through stuffing box

3 nozzles always open



Coppus Steam Turbines, Type TF, driving chemical transfer pumps at Celanese Corporation of America's Chemcel Plant

Coppus Steam Turbines ranging from 150 hp down to fractional in 6 frame sizes

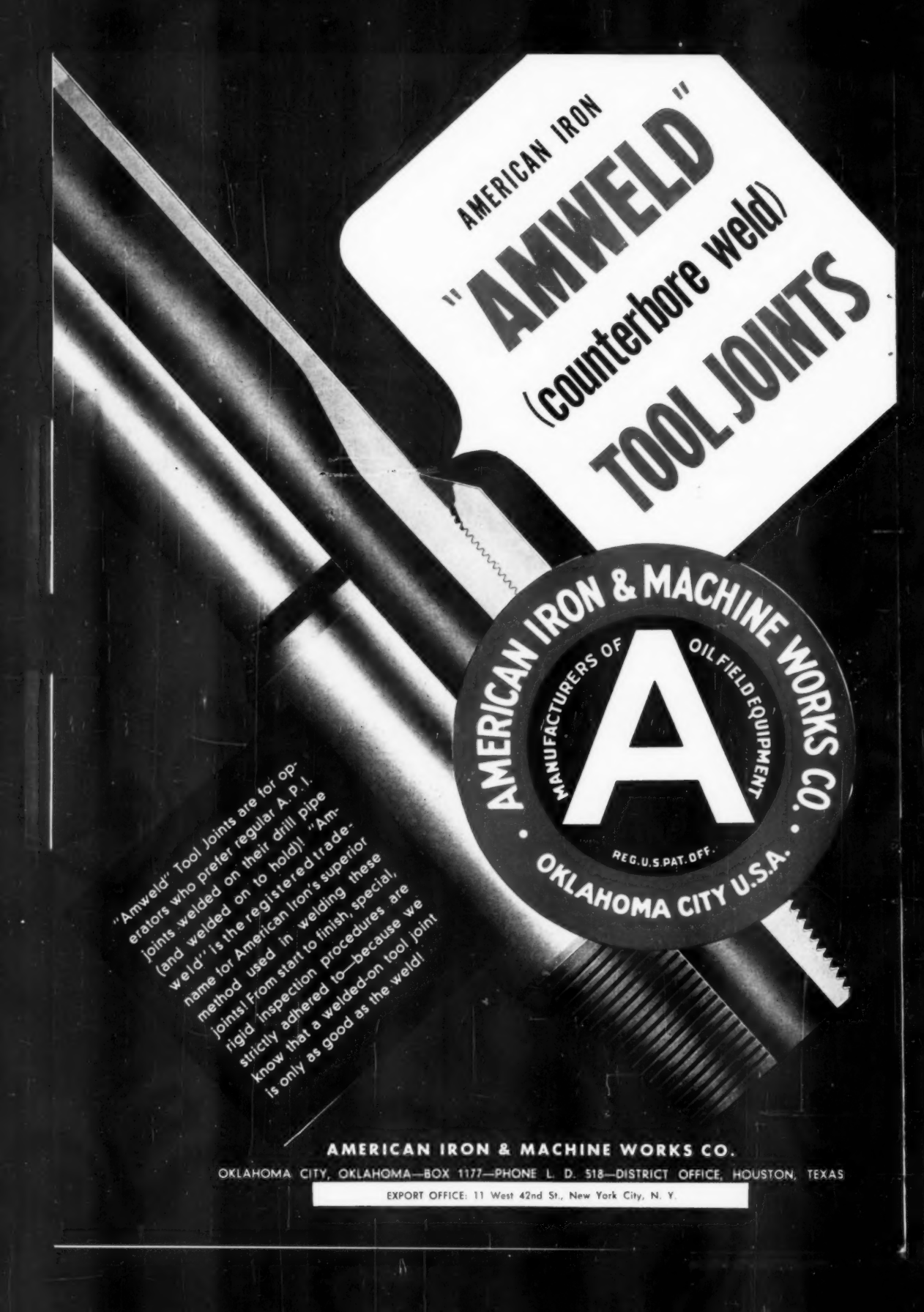
MAKE TURBINE DOLLARS GO FARTHER

Why waste money buying turbines with higher horsepower ratings than you need? The higher the horsepower rating, the higher the price. Save money by selecting the Coppus Turbine size closest to your requirements from 150 hp down to fractional. And when you do, you save operating and maintenance costs, too. That's what these other Coppus features are designed to do: exclusive pilot operated excess speed safety trip supplementing constant speed governor; choice of metallic or carbon ring packing assemblies. Designs available for back pressures up to 75 pounds; replaceable cartridge type bearing housings. For full details . . .

WRITE FOR BULLETIN 135

COPPUS ENGINEERING CORP., 262 Park Avenue, Worcester 2, Mass. Sales offices in THOMAS' REGISTER.

COPPUS *BLUE RIBBON* TURBINES


AMERICAN IRON
"AMWELD"
(counterbore weld)
TOOL JOINTS
AMERICAN IRON & MACHINE WORKS CO.
MANUFACTURERS OF
OIL FIELD EQUIPMENT
A
REG. U.S. PAT. OFF.
OKLAHOMA CITY U.S.A.
"Amweld" Tool Joints are for operators who prefer regular A. P. I. joints welded on their drill pipe (and welded on to hold)! "Amweld" is the registered trade-name for American Iron's superior method used in welding these joints! From start to finish, special, rigid inspection procedures are strictly adhered to—because we know that a welded-on tool joint is only as good as the weld!

AMERICAN IRON & MACHINE WORKS CO.

OKLAHOMA CITY, OKLAHOMA—BOX 1177—PHONE L. D. 518—DISTRICT OFFICE, HOUSTON, TEXAS

EXPORT OFFICE: 11 West 42nd St., New York City, N. Y.

STABILITY here says—

"The unit is right on line..."

CRACKING SUPT. says—

"...with L&N Pneumatic Control, we can now operate at higher coil outlet temperature than ever before..."

L&N PNEUMATIC CONTROL gives you—

- Superior *stability of control point*
- True *"no bump" switch* from manual to automatic regulation, as well as vice versa
- *Rate action* perfectly integrated into the control circuit for smooth, swift recovery from upsets
- *Complete flexibility of adjustment* for simplest to toughest jobs

For details, write Leeds & Northrup Co., 4959 Stenton Ave., Phila. 44, Pa.

Some time ago, a West Coast refinery installed a Speedomax Pneumatic Controller and pressure-balanced control valve to handle coil outlet temperature of the gas-fired heater on a thermal cracking unit. Products include fuel oil, gas oil, stove oil, and pressure distillate.

Result? Yield of premium products increased . . . with fuel oil production held to a minimum. All other fractions coming from the unit now meet specifications more closely. This is due to Speedomax Control's stability, as shown right on the job—stability which holds the control point steady under all operating conditions. This stability permits higher operating temperatures than ever before; and higher temperature means better product.

Proof wasn't long in coming. As soon as Speedomax had been on duty long enough to apply the refinery's usual quality control procedure, the instrument was given the final seal of approval as a really paying investment.

MEASURING INSTRUMENTS - TELEMETERS - AUTOMATIC CONTROLS - HEAT-TREATING FURNACES

LEEDS & NORTHRUP CO.

[6] AJ ND46-33A-702(1)

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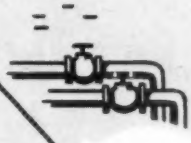
SUPPLY
BOVAIRD
COMPANY

DRILLING

PRODUCING



PIPE LINE

REFINING

when you need supplies

BOVAIRD stores are conveniently located throughout Illinois, Kansas, Oklahoma and Texas to provide you with the right supplies with the least possible delay. The complete stocks maintained by all BOVAIRD stores let you keep your field inventories at a minimum with the assurance that you can get what you need when you need it.

OFFICES AND STORES

ILLINOIS—Clay City, Grayville, Salem
KANSAS—Chase, Great Bend, McPherson, Pratt, Russell, Wichita
OKLAHOMA—Duncan, Oklahoma City, Pauls Valley, Ringwood, Sapulpa, Seminole
TEXAS—Borger, Dallas, Odessa, Pampa, Snyder

"Buy From Bovaird"

THE Bovaird SUPPLY CO.
GENERAL OFFICES
TULSA, OKLAHOMA

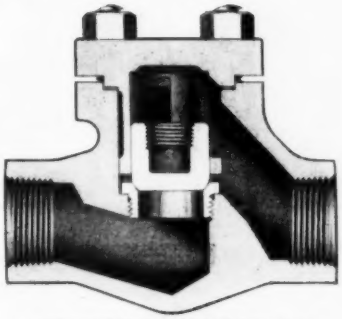
Piping for every refinery installation ...from one complete line...CRANE

SEVERE SERVICE SUITS THESE CHECK VALVES

Rugged, yet unusually compact, Crane 600-Pound Forged Steel Lift Checks are made specifically to withstand severe service on high pressure, high temperature steam and oil lines. Famous Crane Quality in design, materials and workmanship assures maximum strength and longer valve life.

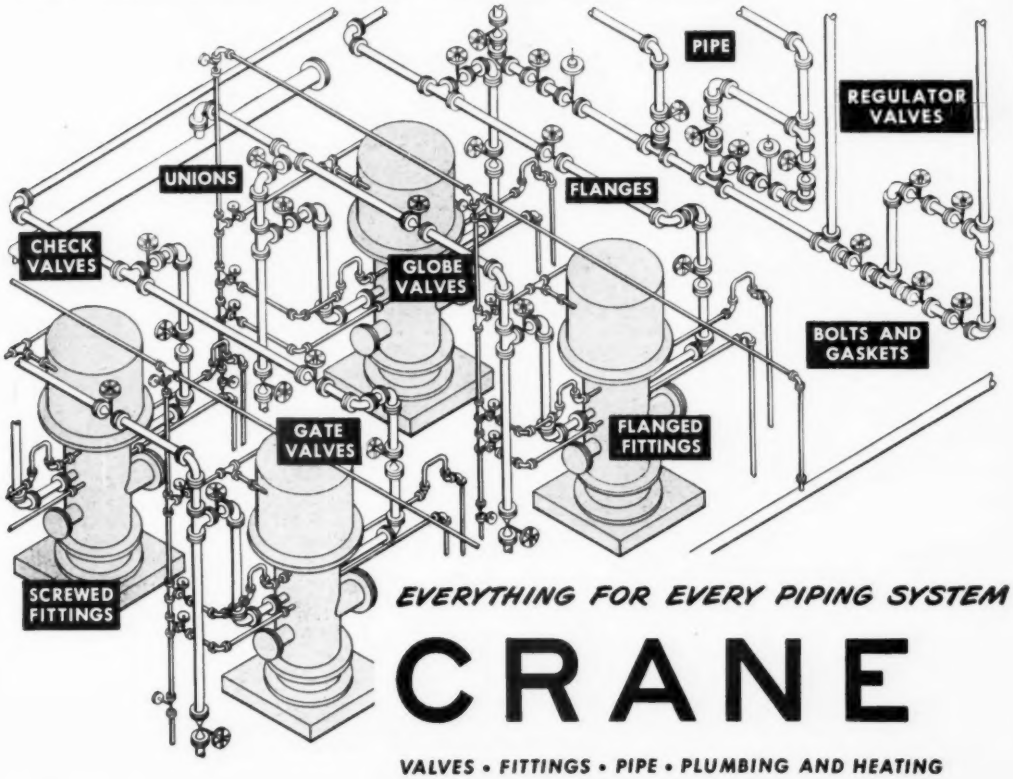
Crane forged carbon steel valve body—reinforced with heavy metal sections—provides a high margin of safety. Both the seat and disc are made of wear-resisting Exelloy. The high-lift disc operates in a specially designed cap that assures proper guiding, square seating, and eliminates destructive chattering. For further information, see your new No. 49 Crane Catalog, p. 248-9.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas



Horizontal Check—Bolted Cap. For oil or oil vapor services up to 1000° F.; for steam up to 850° F. and for water, air or gas. Sizes: ½ to 2 in. Screwed, flanged or welding ends.

● ONE ORDER TO CRANE COVERS ALL PIPING EQUIPMENT NEEDED FOR THESE GLAND OIL AND COOLING WATER LINES



EVERYTHING FOR EVERY PIPING SYSTEM

CRANE

VALVES • FITTINGS • PIPE • PLUMBING AND HEATING

"Ready-made" PIPE HANGER for a "made-to-order" FIT

Look how closely this 8-inch steam main is tucked up under the roof. And, at 410 p.s.i. and 550° F., this piping was bound to move up and down enough to need flexible support. Just the hanger to fit this situation was ready and waiting right in the Grinnell Pipe Hanger Catalog 10-D . . . the Pre-Engineered Spring Hanger fig. B268, type G.

Every pipe suspension problem is pre-solved for you by Grinnell ready-to-install hangers and supports. You can get a copy of Catalog 10-D from your Grinnell branch warehouse or local Grinnell jobber.

GRINNELL

Grinnell Company, Inc., Providence 1, R. I. Warehouses: Atlanta • Buffalo • Charlotte • Chicago • Cleveland • Cranston • Fresno • Kansas City • Houston • Long Beach Los Angeles • Milwaukee • Minneapolis • New York • Oakland • Philadelphia • Pocatello • Sacramento • St. Louis • St. Paul • San Francisco • Seattle • Spokane

for the TOPS in Performance, Speed, Economy, Strength, Safety, Style, and Comfort . . .

it's the new Beechcraft for 1950

"EXTRAS" make this NEW BONANZA a better buy!

★ New increased horsepower for better take-off performance

★ New safety-type control wheel ★ Four new individual arm-rests

★ New Beechcraft propeller for better performance

★ New RCA Radio with VHF ★ Three new utility map pockets

★ New increased and faster action flap travel

★ New and faster travel action for landing gear

★ New navigation light reflectors ★ New oil tank access door

★ New attractive instrument panel design

★ New exterior paint design ★ New interior upholstery combinations

Ruggedness plus Speed . . . Performance plus Economy . . . Beauty plus Power

The world-wide operational records of the more than 2200 Beechcraft Bonanzas now in service are *proof* that the Beechcraft Bonanza delivers high payload, high speed, and low operating cost, combined with extra safety and greater comfort – PROOF that the NEW Beechcraft Bonanza is a better buy!

It's easy to enter or leave the 4-place Beechcraft Bonanza with its unique retractable step and wide auto-type door. Room for 4 big people to ride in comfort. Maximum 5-way visibility and sound-proofed, smartly appointed cabin add to the limousine luxury of this new Beechcraft Bonanza for 1950.

Compare these performance features

- Top speed, 184 mph
- Cruising speed, 170 mph
- Range, 750 miles
- Service ceiling, 17,100 feet
- Fuel economy, 9½ gal. per hour

Compare these comfort features

- Exclusive retractable step
- Limousine entrance
- Insulated, sound-proofed cabin
- Quickly removable rear seat
- Luggage compartment accessible two ways

● These are only a few of the hundreds of reasons why the NEW Model B35 Beechcraft Bonanza is a *better buy! See* it today! Get all the facts about the many *extra* advantages of Beechcrafts from your nearest Beechcraft distributor or dealer – or drop a line of request on your company letterhead to Beech Aircraft Corporation, Wichita, Kansas.

Beechcraft

BONANZA

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

They Say—

Oil-Coal Dispute

Sir:

I have read with great interest Mr. Ralph's article "We Say" in the January 5 issue of The Oil and Gas Journal (page 15). I am sorry that he did not know of the work that the A.P.I. Statistical Advisory Committee has been doing to have the Labor Department provide a separate index of prices for petroleum products. The Bureau of Labor Statistics is about ready to come out with a separate composite of petroleum prices and a more detailed report on prices of specific petroleum products.

It is my understanding that at this time they intend to base their index of prices of petroleum products on 1947 as 100, but will still continue to show the index on coal and petroleum as a composite with 1926 as 100. The committee is still making efforts to have them consider a more recent date on all prices as the basis for comparison.

E. T. Knight,
Atlantic Refining Co.,
Philadelphia.

Oil fields tough?

So are Gilmer Multiple V-Belts!

A finer phrase for *V-belt guts* is *Gilmer Rayon Pulling Cords*—inherently strong—inherently low in friction—inherently cool-running—and then "normalized" the Gilmer way to give you matched multiples that stay matched.

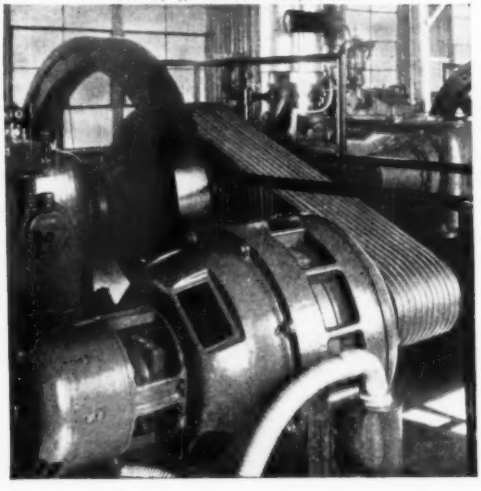
With load per cord equalized, and with cords positively, separately cushioned, you get every safeguard against belt deformation. That keeps tough-jacketed, straight-sided Gilmer V-Belts snug to the sheaves—running and slacking off smoothly—saving power, belt replacements, downtime and your money.

L. H. GILMER COMPANY

Tacony, Philadelphia 35, Pa. Division of United States Rubber Company

Gilmer BELTS **BUY THROUGH YOUR GILMER DISTRIBUTOR**

In a gas booster station, this generator is driven by Type D 210 Gilmer Multiple V-Belts



***Gilmer* has the PULL**

Specially conditioned **Gilmer Multiple V-Belts are made for extreme oil conditions, heat, static, and moisture.**

The "2-in-1" belt is Gilmer Kable-Kord—the Contactor-Power Flat Belt. Other Gilmer Flat Belts—cut edge or endless continuous cord—will put the brakes on stretch for you.

Whatever your power belt problem, ask for the help of Gilmer Engineers.

V-BELTS FLAT BELTS
HOSE PACKING
WIRE TAPE

Census Bureau Defense

Sir:

We have noted the editorial comments by Mr. Henry D. Ralph (January 5, page 15) . . . on the Census Bureau's classification "Products of Petroleum and Coal."

In Census publications, statistics for "Products of Petroleum and Coal" are almost always accompanied by more detailed statistics showing separately figures for "Petroleum Refining," for "Lubricants, Not Elsewhere Classified," and the various petroleum and coal-products industries. The broad class "Petroleum and Coal Products," from our standpoint, is primarily a convenient grouping of reports for several industries for publication purposes. Census funds did not make it feasible to publish individual reports for each of the manufacturing industries. Instead, the statistics for several industries were grouped together in one report. Since many persons who are interested in the petroleum-refining industry are also interested in other petroleum and coal-products industries, it seemed preferable to combine petroleum refining with these industries rather than, for example, with the chemical industries or the rubber-products industries. . . .

We appreciate the comments of users of Census statistics and are anxious to present the material in as usable a manner as possible.

Philip M. Hauser,
Acting Director,
Bureau of the Census,
Washington.

New Asphalt Use

"Few know that recently several state highway departments started using asphalt in another way. They are putting it *under* highways.

"Object: To subseal rigid-type pavements that have started to fail as a result of the seepage of water into the subgrade under the slab.

"The hot, liquid asphalt is injected under pressure into holes drilled through the concrete surface of roads and fills cavities caused by erosion, forming a foundation surface that will help prevent further deterioration."

The Atlantic Magazine, Atlantic Refining Co.

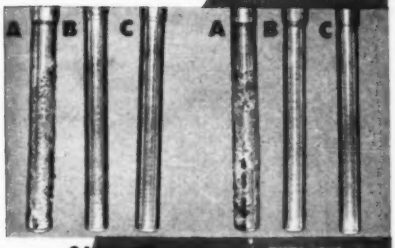
Fractionating-Tower Research

"With the best possible column-tray design as their goal, Shell researchers at the Houston refinery are now conducting experiments on a full-size fractionating tower. Through special glass ports in the column wall they look inside and watch the action of the vapors and liquids on experimentally designed trays. Parallel wires are stretched above the trays to measure the height to which the bubbles and droplets of liquid bounce

STOP RUST

with Monsanto's New

SANTOLENE C



Concentrations of Santolene C in tests with light petroleum products are as follows: (A) No Santolene C, test failed; (B) 10 ppm. Santolene C effective, but test failed; (C) 20 ppm. Rust absent. Test passed.

PHYSICAL PROPERTIES OF SANTOLENE C

Color ASTM	5½
Flash Point COC° F.	170
Viscosity at 100° F. SUS	259
Viscosity at 210° F. SUS	52
Pour Point °F	—30
Sp. Gr. 60/60° F.	.884
Pounds per gallon	7.36

The rust problem, in transportation and storage of light petroleum products, is solved by Monsanto's Santolene C. Laboratory tests, results of which are illustrated in the photograph, give evidence of the effectiveness of Santolene C.

Santolene C, effective when used in small quantities, is economical, costing only about 0.14 cents to inhibit rust in a 42-gallon barrel of gasoline or oil. Concentrations up to .01% of Santolene C have no noticeable effect on the usual specification items for gasoline, kerosene and No. 2 fuel oil, with the exception of ASTM glass dish gum on gasoline at higher concentrations. Here the increase in gum was only about 1 mg. per 100 cc. per 0.002% of Santolene C. Santolene C is available . . . now . . . in commercial quantities.

If you would like to put Santolene C over the hurdles in your laboratory, we shall be glad to send you a sample. For further information, mail the coupon or write: MONSANTO CHEMICAL COMPANY, Desk A, Petroleum Chemicals Department, 1745 South Second Street, St. Louis 4, Missouri.

Santolene: Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS — PLASTICS

MONSANTO CHEMICAL COMPANY
Desk A, Petroleum Chemicals Department
1745 South Second Street, St. Louis 4, Missouri

Please send, without cost or obligation, items checked: ..... Data on Santolene C; .....Sample for our laboratory.

Name ..... Title .....

Company .....

Street .....

City ..... Zone ... State .....

SERVING INDUSTRY . . . WHICH SERVES MANKIND

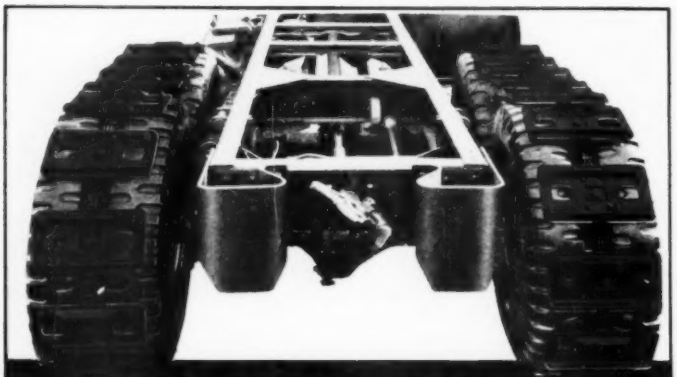
and tubes running into the tower are used to take samples at different points on the tray for chemical analyses in the laboratory. These analyses can be used in the calculation of column efficiency.

"Six viewing ports are spaced around the experimental tower. The researchers, however, don't content themselves with merely *looking*—they take pictures as well. A high speed camera specially designed to record the mechanism of vapors bubbling through swift-moving liquids does the job. Screening the pictures in slow motion allows the scientists to see more clearly what is going on in a fractionating tower. A control panel at the base of the tower enables them to set up specific test conditions.

"The number and arrangement of bubble caps on a tray are changed and tested under various conditions. New designs for trays are tried out. The number and spacing of trays in the column are studied and altered. Tests are run for different varieties of products.

"With the inside information now being gathered by Houston researchers in their study of this full-scale operation, Shell will be able to manufacture greater quantities of high-quality products."

Shell News, Shell Oil Co.



NOW BETTER THAN EVER
TRUCK TRACKS
ARE BEATING WINTER MUD AND SNOW

All-steel TRUCK TRACKS can eliminate bad weather shut-downs by adding tractor performance to your single or tandem axle equipment. Drivers can mount them in 10 minutes . . . remove in less. Nothing to break, bend or loosen.

TRUCK TRACKS NOW USED ON

QUICK-WAY SHOVELS & CRANES - GRADALLS
P & H CRANES - LORAIN MOTO-CRANES
SCHIELD-BANTAM SHOVELS & CRANES -
NORTHWEST CRANES - HYSTER FORK LIFTS
UNIT CRANE - MANDT SWING LOADER
WAYNE CRANES - BYERS SHOVELS & CRANES
LITTLE GIANT SHOVELS & CRANES -
DRILLING RIGS, TRACTORS AND MANY OTHER TRUCK-MOUNTED SHOVELS AND CRANES

If you're bogged down, contact your local dealer
or
Call, Wire or Write

P & G SUPPLY CO.

615 S. E. MARKET ST., DEPT. E
PORTLAND 14, OREGON

WHAT USERS SAY:

. . . have found Truck Tracks most satisfactory. We were able to drive over soft sand to all parts of the work. Pacific Bridge Co.

. . . 85,000 lbs. rest on our Truck Tracks . . . enabled us to move our cranes when we want to. Gilbane Building Co.

. . . when job sites are inaccessible to wheeled vehicles by rain and mud, we can mount our Truck Tracks and erect steel without interruption. Industrial Steel Erection Co.

The truck with chains was unable to pull out of the pit, while the Truck Tracks walked up as nice as you could want. United Clay Mines Corp.

. . . we found Truck Tracks enabled us to move from well to well without use of a cat or winch truck. Layne Western Co.

. . . operated crane on terrain that full crawlers would have been hard pushed to travel. Kingston Contracting Co.

. . . Truck Tracks will do all that you claim. Hoosier Engineering Co.

How To Order:

Send tire size; whether single or tandem axle. Include shipping instructions.

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C. T. Foster, president of Standard Oil Co. of Ohio, written in The Sohioan.

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George W. Codrington, vice president of General Motors Corp. and general manager of the Cleveland Diesel Engine Division, as quoted in the New York Times.

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"At the Baton Rouge refinery approximately 640 products are manufactured, and when it is considered that these are made from a single raw material, the problem of manufacturing these materials to meet rigid specifications, and at the same time in the most economical manner, can be appreciated."

Cecil Morgan, vice president of Esso Standard Oil Co., addressing the Louisiana Engineering Society, New Orleans.

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12-P	5 x 12	70	540	100	270	386	9264
12P-LD	6 x 12	70	365	100	395	564	13536
612-P	6 x 12	70	520	140	390	557	13368
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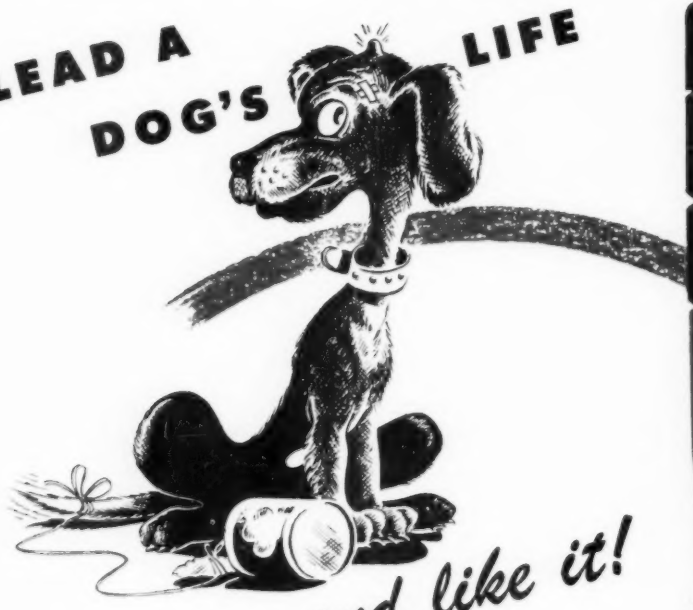

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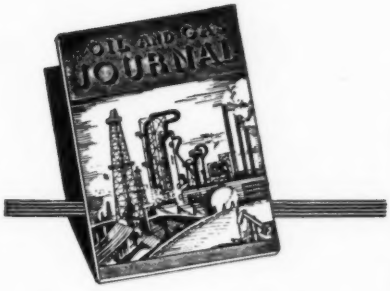

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JOURNALLY Speaking

Inside Scurry

THIS picture illustrates a lot of things about the inner workings of our favorite oil publication.

In the first place, it's about Scurry County, and calls attention to the article farther on in this issue which gives all the latest geologic and engineering disclosures on this hot spot.

In the second place, it shows the Journal was on the job.

In the third place, it illustrates how the work gets done.

Standing on a rig of Standard Oil Co. of Texas on the G. E. Parks lease are three members of the Journal's staff. In the necktie and immaculate sports jacket is Kenneth B. Barnes, our engineering editor, who lives in Tulsa. Mr. Barnes is directing the operation. The two in working clothes are doing the work.

On the derrick floor is Dave Stormont, who lives in Dallas but covers the whole southwestern beat. He wrote the article.

On the steps is R. B. Ward, who lives in his car and sleeps with his camera for a pillow. He took the pictures.

How he managed to click the shutter and get in this picture at the same time must have been an unusual feat, but R. B. is a fast operator and unusual feats are his stock in trade.

R. B. clicks pix for us all over. Been doing it for more years than he will admit. This is probably the first time his name, and certainly the first time his face, has even appeared in this publication, though his pictures are liberally scattered through every issue.

You may be on intimate terms with all the big-name industrial photographers who take those arty angle shots for the picture mags and office murals and still never have heard of R. B. Ward. That's quite understandable, because he ignores the glamor and gets right down in the mud and grease to get pictures of equipment and operations that convey information of value to practical oil men.

There is hardly a driller or refinery manager between the Appalachians and the Sierra Nevadas who doesn't know R. B. He is on the road all the time, dropping in to Tulsa now and then just long enough to develop his negatives and change his shirt.

And here is a little secret which our college-bred engineering writers probably hate to have disclosed: R. B. often tells them how to write their articles and what to write about.

He always has some hot tips on where something unusual is going on in the oil industry, and pictures to prove it. Then he explains to our boys what the equipment is all about and how this or that gadget operates. He can spot more novel wrinkles in an oil operation than the operators themselves know about, and there aren't many men in the country who know more about oil equipment and how it is used.

All he wants to do is cruise around snapping shots of oil activities, and that suits us fine. If R. B. ever decides to settle down and operate a portrait studio you readers would be missing some mighty fine operating pictures and—confidentially—our editors would be missing a lot of valuable tips for practical engineering articles.

—*Henry D. Ralph*

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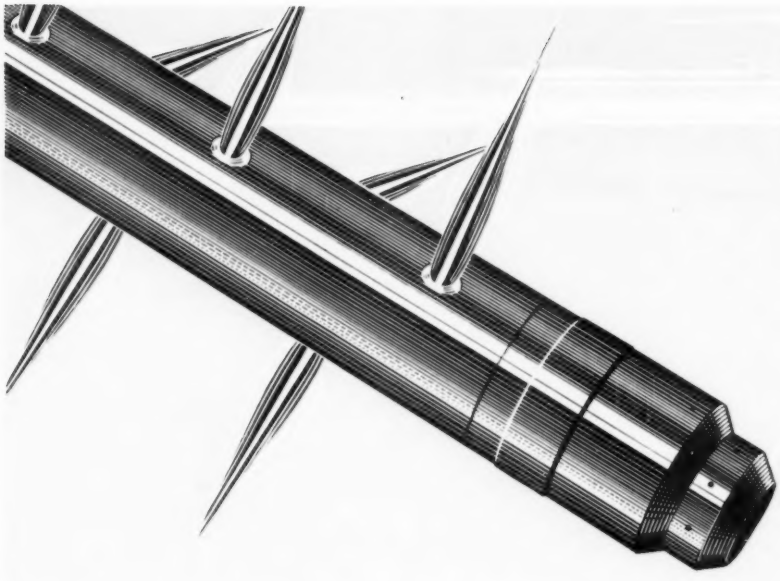

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Percentage Depletion

THE President's attack on percentage depletion in the oil and mining industries as a tax loophole is in character for an administration which knows that it can perpetuate itself only by continued reckless spending, and which is desperately seeking new sources of revenue which will not have unwanted political repercussions in an election year.

Nothing new has developed indicating that the present oil and gas depletion provisions should be ended or reduced as to percentage. In fact, if a fair and complete investigation results, the weight of the evidence will be on the side of liberalization.

The depletion act became effective in 1926, after long investigation by Congress. It was a practical application of a taxing principle previously recognized by Congress and which in turn had a background of English mining law going back more than three centuries.

Briefly reiterated, the 27½ per cent depletion allowance isn't a "tax gift," a "tax avoidance" or anything of the kind, but represents a return of capital to those engaged in the hazardous pursuit of finding and producing oil. In principle, applied to an irreplaceable asset it is exactly the same as depreciation allowance for manufacturing enterprises and other replaceable business operations in arriving at taxable income.

The 27½ per cent depletion figure originally was a compromise figure of the two branches of Congress, arrived at after an investigation had shown that the allowance should be in excess of 30 per cent in an industry-wide application. Actually, because of the statutory limitation based on net income, operators as a group do not receive the full 27½ per cent.

So much for the position of the oil and gas industry. What about the depletion provisions in relation to public policy?

A practical objective of the depletion allowance is to encourage operators to find plenty of oil. This they have done—too much at times for their own good. These supplies have not only been large enough to take care of the steadily expanding needs of a peacetime economy but have been adequate for two major war emergencies.

Then there is the matter of petroleum's cheapness. The latest government report shows the all-commodity index to be 152.2, that of petroleum 110.1. This means yearly savings to users of petroleum many times greater than the total depletion allowances.

Outstanding efficiency in production, refining, and transportation are factors in the low index of petroleum extending over many years, but it starts with the fact that the capital protection that depletion affords producers has supplied in part the wherewithal needed to find sufficient oil. Without that incentive oil prices most assuredly would be more in line with the commodity levels.

The oil industry has much at stake in defending this latest attack on its tax position, but that of tens of millions of consumers is much greater.

THIS WEEK

CRUDE OIL—U. S. has capacity to produce between 700,000 and 1,000,000 bbl. per day in excess of current demands, NPC committee reports. . . . Expects excess capacity to remain at 1,000,000 bbl. daily for next 3 years. . . . Explains how industry can find new reserves when needed. . . . ¶Atlantic Refining Co. announces new high-pressure-gas producing method. . . . Claims up to 90 per cent oil recovery. . . .

IMPORTS—NPC officially says imports now hurting domestic oil industry. . . . ¶Gulf and Jersey Standard announce voluntary reductions in crude imports. . . . ¶I.P.A.A. lists possible curtailment devices. . . . ¶Interior Department makes confidential report to White House. . . . ¶House committee suggests Government sanction curtailment agreement among importers. . . . ¶Patman asks President to invoke escape clause in reciprocal trade agreements. . . .

COUNCIL—NPC gets plea for straightforward government-industry cooperation to meet present economic problems. . . . Opposes bill to create petroleum policy council. . . . Urges no change in competitive-bidding requirements for public-land leasing. . . . Reelects officers. . . . Receives series of committee reports. . . .

TRENDS—Crude and four major product stocks decreased at the rate of 464,000 bbl. daily in the first 3 weeks of January compared with about 15,000 bbl. daily in January 1949. . . . Gasoline stocks increased 420,000 bbl. daily in the 3-week period. . . . Light and heavy fuel stocks decreased 631,000 bbl. daily. . . . Crude stocks decreased 253,000 bbl. daily. . . . ¶At the present rate of increase, gasoline stocks would pass the 140,000,000 mark before the middle of March. . . .

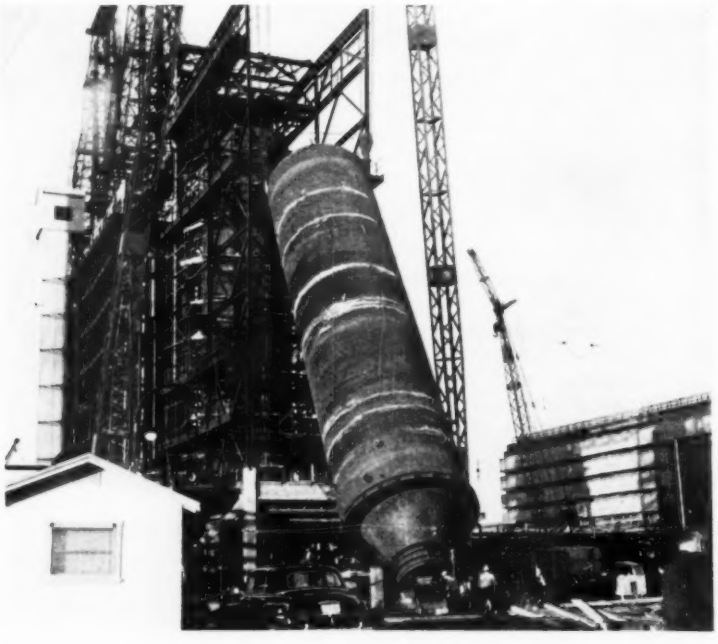
ACTIVITY—Crude-oil production for the week ended January 28 averaged 4,875,865 bbl. daily, a decrease of 310 bbl. daily from the previous week. . . . ¶Total well completions dropped 54 wells to 662 for the week compared with 609 in the same week last year. . . . Wildcat completions were off 19 wells to 92. . . . ¶Rotary rigs operating in the United States decreased 10 rigs to 1,947 on January 23. . . .

INTERNATIONAL—British Empire embargo on dollar oil disclosed to have been adopted after U. S. officials hinted there would be little opposition. . . . ¶Venezuelan Government reported ready to grant new concessions and invite entry of additional companies. . . . ¶New Philippine oil law reasonably favorable to exploration by American capital. . . . ¶Hope abandoned for reconstruction of Burma's oil industry. . . .

NATURAL GAS—Plans completed to build 1,000-mile line to take Canadian gas to U. S. Pacific Northwest. . . . Westcoast Transmission Co. awaits only provincial permit. . . . ¶FPC sets hearings on plans of Trunkline Gas Supply Co., Texas Illinois Natural, and Panhandle Eastern to construct lines in Midwest areas. . . . ¶Applicants to serve New England with natural gas will get consolidated hearing in March. . . . New firm enters bid for New England business. . . .

DEPLETION—Republican spokesman charges political motives in administration's attack on oil depletion allowance. . . . ¶Industry men say proposed changes would mean big increase in cost of crude. . . . ¶Observers believe Congress may not adopt President's recommendations on depletion. . . .

REFINING—January survey shows gasoline octane ratings rising throughout country. . . . ¶Coastal Petroleum Corp. sells its Mobile refinery to American Bitumuls. . . . ¶Work to begin soon on Deep Rock Oil Corp.'s new research laboratory at Cushing. . . . ¶Phillips Petroleum Co. to start work immediately on new oil-separating and processing plant at Okmulgee.



RESID ELIMINATOR.—The problem of disposing of surplus residual fuel oil, particularly acute in the heavy-crude area of California, has been alleviated for General Petroleum Corp. by its battery of coking units which turn resid into light products, cracking stock, and solid coke. A new coking chamber, shown here being hoisted into place, went on stream this week, giving the battery capacity now to charge 22,000 bbl. of residual daily.

Harris Bill Opposed

NPC committees condemn creation of oil policy council, oppose change in leasing law, predict gain in L.P.G.

Bertram F. Linz

WASHINGTON.—The National Petroleum Council last week reported to Interior Secretary Oscar L. Chapman that the Harris bill to establish a petroleum policy council "is not in the public interest" and should not be enacted.

An analysis of the measure was one of a number of important reports submitted at the 1950 organization meeting of the council.

With Rep. Oren Harris of Arkansas, author of the measure, present in the conference room, J. Howard Marshall of Ashland Oil & Refining Co. submitted his committee's analysis of the bill. In view of the demonstration during and since the war of full cooperation between government and the industry, he said, there is no necessity for the bill.

Further, Marshall declared, the creation of the proposed council with the functions and authority provided for in the bill "is both unnecessary and harmful to the national interest" and would disrupt a procedure that has proven effective.

The report, prepared as a guide to the Interior Department, which has been asked to express its views on the measure, summarized the provisions of the bill, under which, Marshall said:

"It will be seen that the proposed petroleum policy council would replace the Oil and Gas Division as now established. The National Petroleum Council would be dissolved and various industry panels established, without control of their action by appropriate articles of organization as now provided by industry for the National Petroleum Council. The petroleum policy council would have broad objectives in the formulation of policy, in compelling compliance therewith by all other departments and agencies of government, and in proposing legislation affecting the petroleum industry for the accomplishment of such broad objectives. The purposes stated are so broad and sweeping in terms as to make possible administrative interpretation and applications that may bring about unnecessary government control and regulation of operations of the petroleum industry. This might seriously impair the flexibility of the industry in supplying petroleum to the public under our competitive system, and is not in the public interest.

"Experience during World War II through the employment of the Petroleum Administration for War and the Petroleum Industry War Council, and experience since the war through the employment of the Oil and Gas Division of the Department of the Interior and the National Petroleum Council, demonstrate that the coordination of activities within the departments of the Government on oil and gas matters and full cooperation between Government and the industry on such matters has been effected," it said. "This is in the public interest."

Harris made no immediate reply to the report, but it was indicated his committee would hold hearings during the present session of Congress on the oil situation generally.

Leasing regulations.—In another report, a committee headed by J. C. Donnell, II, of Ohio Oil Co., expressed opposition to any change in the law or regulations which would require or permit the Interior Department to lease public domain or acquired land at competitive bidding in any instances other than those in which competitive bids are now required.

The report covered the several changes in leasing laws and procedures which have been proposed by the department and were to have been discussed at a hearing in Denver last month.

Competitive bidding wherever a "competitive interest" is evident, Donnell declared, would be contrary to the present policy of Congress, would not expedite the granting of leases but, rather, would slow up the procedure, and would not assure any greater return to the Government than the present system.

Further, he said, competitive bidding would give an undue advantage to the large companies which have sufficient capital available for bidding and would work a hardship upon the small individual operators. In the Rocky Mountain region, where public lands constitute a large portion of prospective oil and gas lands available for development, it would force many small operators out of business.

Industry manpower.—A report on industry manpower submitted by W. W. Vandeveer showed that, on the basis of replies to questionnaires covering at least 70 per cent of domestic production and refinery intake, it is estimated that 39.9 per cent of male employes are under the age of 35, 37 per cent of all male employes are engaged in jobs requiring less than a year's replacement training, and 6.2 per cent are members of the Armed Forces Reserves or National Guard.

A request by the National Security Resources Board for a list of the companies reporting as an aid in determining the actual extent of coverage of the survey and to enable the board to estimate industry totals was laid before the council by the committee with a recommendation that it be granted.

L.P.G. report.—A report on liquefied petroleum gas by W. K. Warren of Warren Petroleum Corp. estimated that production this year would increase 17 to 18 per cent over 1949 while over-all demand will increase 12 per cent. Given weather conditions prevailing during the past 2 years, consumption will be 3,775,000,000 gal., an increase of 19½ per cent, for domestic use, but exports, industrial use and chemical demand will increase only slightly.

Warren's committee reported that the industry has reached a maximum of facilities for transportation, with 3,550 new high-pressure tank cars added during 1948-49, and no shortage is anticipated.

Hallanan address.—A record-breaking attendance of more than 65 members heard Walter S. Hallanan warn that the industry is "beginning to face another economic horizon that seems to bring problems of greater magnitude than we have known either in war or in peace."

"We are face to face with the problems that arise from overdevelopment of potential crude reserves, both at home and in foreign fields—and these must be dealt with very realistically if we are to maintain an orderly and healthy equilibrium," he said.

"For the petroleum industry to fail in this peacetime undertaking by reason of its unwillingness to cooperate with the government would, in my opinion, turn the clock back many years and leave the industry open to the most dangerous assault it has ever faced.

"It would be unthinkable now for the petroleum industry to turn back. We must meet the challenge of our time by giving a straightforward demonstration of our consciousness that we represent an industry that is indispensable in every phase of our American life."

Chairman Hallanan and all other 1949 officers were reelected, with A. Jacobsen of Amerada Petroleum Corp. named as chairman of the agenda committee to succeed the late George A. Hill, Jr.

A memorial resolution eulogizing Hill was adopted by the council, which also approved a budget of $70,000 for the current year.

Adequate Reserves

Domestic oil backlog is sufficient to meet all demands within the foreseeable future, NPC told by committee

Bertram F. Linz

WASHINGTON. — Present domestic petroleum reserves are adequate to meet all demands of the foreseeable future, and in the event of an emergency present production could be upped by 700,000 bbl. daily with an additional 1,000,000 bbl. daily available through rationing, the National Petroleum Council was told January 26 in a report by its crude petroleum reserve productive capacity committee headed by L. F. McCollum, president of Continental Oil Co.

The committee estimated that by 1952-53, barring any new development tending to upset the present outlook for supply and demand, the United States should have a reserve capacity in the neighborhood of 1,000,000 bbl. daily, putting the country in as good shape as it was at the outbreak of the last war.

Tax fears voiced. — The committee warned, however, that achievement of this desirable position would be seriously jeopardized by any restrictions on the depletion allowance along the lines recommended to Congress by President Truman.

Continuance of reasonable tax provisions designed to take into consideration the unusual risks and peculiar circumstances of the petroleum industry will encourage effort to increase the nation's reserves, the committee reported, but "any change which would increase tax burdens on the production of petroleum above the present level would automatically reduce the incentive for development and make it that much harder to create reserve productive capacity."

The committee pointed out that twice within the past 25 years the industry, by creating a substantial margin of reserve capacity, has dispelled fears of a shortage that would endanger national security, and it expressed confidence that the normal competitive operation of the industry, "in a favorable climate, unhampered by new regulations, will dispel any apprehension that now may be felt that a new emergency would catch us unprepared."

What is needed.—Needed to encourage the industry to attain the position which defense officials deem necessary, the committee said, is proper encouragement of development of the Continental Shelf, either by continuance of the "reasonably satisfactory" state leasing laws or, if the lands finally get into the hands of the Government, recognition of existing leases and provision of federal leases in such form as to preclude the possibility of changes in terms or obligations during the period of the leases, and extension of the state conservation laws to the outer limits of the shelf.

Definitely not needed, the council was told, are artificial controls such as the purchase by the Government of proved domestic reserves to be withheld from the market, the accumulation of large stocks in storage tanks, the withholding of public lands from development, direct participation by the Government in petroleum operations, or any government interference with price.

Further, it was said, in view of the present reserve outlook, there appears to be no need for commercial-scale production of liquid fuels from coal or shale in the next few years, although substantial quantities of synthetic fuels can be made available "when and if warranted by the prices of products from crude oil, or if required in a national emergency, given sufficient time and an adequate supply of materials."

In the event of an emergency, the committee reported, the additional supply available for war purposes by reserve capacity and rationing could be bolstered by the allocation of materials and manpower for continued development of petroleum resources, encouragement of secondary recovery, and the utilization of production from Canada and Latin America, the last, of course, contingent upon the ability to protect tanker movements.

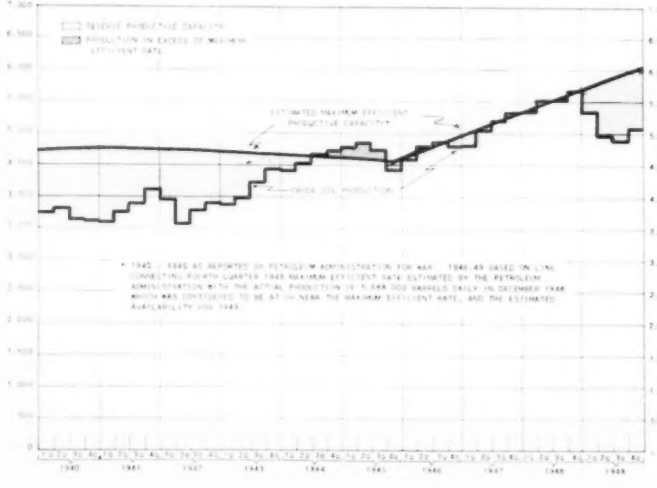
The committee cited imports in excess of economic needs as a potential retardant of domestic development, but did not enlarge upon that subject.

Chairman's statement. — In a letter transmitting the report to Council Chairman Walter S. Hallanan, McCollum expressed confidence in the ability of the industry to meet all needs.

"There is no question that large additional discoveries remain to be made in the United States, and productive capacity can continue to increase," he said. "The results in 1948 and 1949 strikingly demonstrated this. As reported by the American Petroleum Institute, additions to prove reserves of petroleum liquids exceeded two billion barrels in 1948. This report is not yet available for 1949, but in its review just now available for 1949, The Oil and Gas Journal estimates that proved reserves increased by 1.25 billion barrels.

"These large additions have been made although production exceeded two billion barrels of crude oil and natural-gas liquids in each year. The rates at which new discoveries will be made and the size of additions to reserve productive capacity will depend on the intensity and magnitude of the industry's exploration and well-drilling activities. As these activities involve substantial investments of risk capital, they fluctuate with changes in the relationship between the probable return on investment and the risk involved.

"There is no secret formula for finding oil, nor any mystery about the industry's success in the past. The only secret is in the wisdom of our competitive incentive system. The committee is confident that the petroleum industry will continue to build adequate reserves to meet future needs if a favorable economic climate prevails as in the past."



Crude Availability

Committee explains reasons for believing country will have 1,000,000-bbl. excess capacity during next 3 years

THE estimate that the United States will have an excess producing capacity of 1,000,000 bbl. of crude oil per day during the next 3 years, made to the National Petroleum Council by the McCollum committee, was based both on current facts and on a projection of historical cycles in the oil industry.

On the basis of the current maximum efficient rate of production, shown in the chart on the opposite page, the committee figured that an average of 550,000 bbl. per day additional crude could have been produced during 1949.

But as of the end of December the excess capacity was 700,000 bbl. per day. This is the difference between the capacity to produce 6,450,000 bbl. daily and the average daily domestic demand of 5,750,000 bbl. However, if the excess of imports over exports is taken into account, the difference between daily availability and the production of all petroleum liquids in December gives an excess capacity of 1,000,000 bbl. daily.

"It is probable," said the committee, "that reserve productive capacity will remain substantial over the next few years. An increase of 2.5 per cent a year in demand between 1949 and 1953 would result in domestic requirements in 1953 of about 6,350,000 bbl. daily, or about 1,000,000 bbl. daily below the availability of 7,320,000 bbl. daily which probably will be obtained under favorable circumstances."

The figure of a productive capacity of 7,320,000 bbl. daily in the United States was taken from the report on long-term availability of petroleum made to the American Petroleum Institute in 1948, and the McCollum committee declared that subsequent events show that this estimate is reasonable and can be attained under favorable economic conditions.

In a historical discussion of alternating periods of crude oversupply and shortage scare during the past three decades, the committee saw considerable significance in the rate of withdrawal from proved reserves. This is shown in the fourth column of the table at the bottom of this page, expressed as percentage obtained by dividing reserves at the beginning of the year by production during the year.

A more usual method is the ratio method, such as that used in last week's issue of The Oil and Gas Journal, pages 190-192, under which reserves at the end of the year are divided by production during that same year. The ratio method shows a high figure when reserves are ample, whereas the percentage method shows a low figure.

The committee found that every time the rate of withdrawal approached or exceeded 9.1 per cent there was general concern over the adequacy of domestic resources.

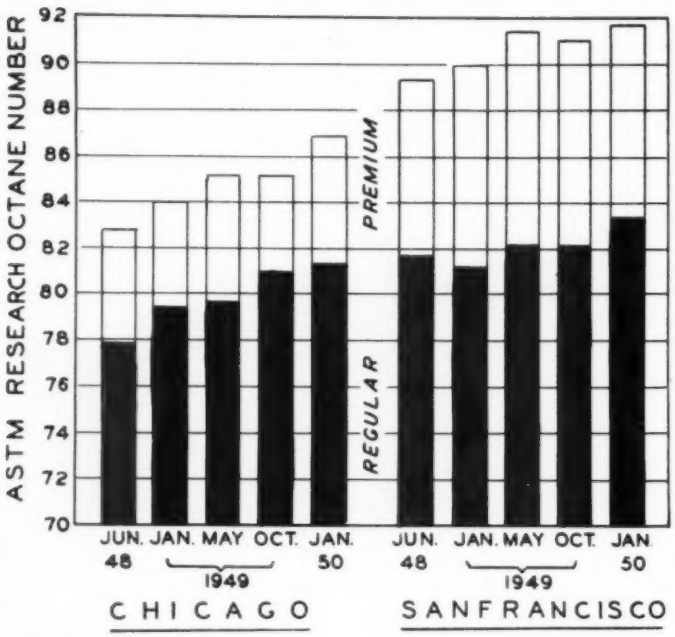
As the table shows, this has happened three times since World War I, but each time the industry brought in large additions to its proved reserves and the percentage figure dropped. At present the country is in a cycle of a decreasing percentage of withdrawals, which is one of the reasons for the committee's statement that there will be excess capacity of 1,000,000 bbl. per day for the next 3 years.

This assumption is strengthened by statistics published last week in the Journal's annual review and forecast number. The Journal's figures for both production and reserves include condensate, and are therefore somewhat higher than those used in the committee's table.

Using the Journal's figures for 1948, crude production was 2,051,463,000 bbl., or 5,605,000 bbl. daily, and proved reserves on December 31 were 24,834,000,000 bbl., which gives a withdrawal percentage of only 8.6. For 1949, based on Journal figures, production was 1,877,304,000 bbl., or 5,146,000 bbl. daily, and reserves on December 31 were 25,909,000,000 bbl., which shows a withdrawal percentage of 7.6.

32-YEAR COMPARISON OF PRODUCTION, RESERVES, WITHDRAWALS

Year	Crude-oil production, thousand bbl.		Proved crude oil reserves Dec. 31, million bbl.	Withdrawal rate per cent of reserves on Jan. 1	New discoveries and revisions, million bbl.	Oil wells producing year end	Production per well, bbl. daily
	Annually	Daily					
1918	355,928	975	6,200			203,375	4.8
1919	378,367	1,037	6,700	6.1	878	227,000	4.8
1920	442,929	1,210	7,200	6.6	943	251,000	5.1
1921	472,183	1,294	7,800	6.6	1,072	274,500	4.9
1922	557,531	1,528	7,600	7.1	358	284,880	5.5
1923	732,407	2,007	7,600	9.6	732	290,100	7.0
1924	713,940	1,951	7,500	9.4	614	299,100	6.6
1925	763,743	2,092	8,500	10.2	1,764	306,100	6.9
1926	770,874	2,112	8,800	9.1	1,071	318,600	6.8
1927	901,129	2,469	10,500	10.2	2,601	323,300	7.7
1928	901,474	2,463	11,000	8.6	1,401	327,800	7.6
1929	1,007,323	2,760	13,200	9.2	3,207	328,200	8.4
1930	898,011	2,460	13,600	6.8	1,298	331,070	7.5
1931	851,081	2,332	13,000	6.3	252	315,850	7.2
1932	785,159	2,145	12,300	6.0	85	321,500	6.7
1933	905,656	2,481	12,000	7.4	605	326,850	7.7
1934	908,065	2,488	12,177	7.6	1,085	333,070	7.5
1935	996,596	2,730	12,400	8.2	1,220	340,990	8.1
1936	1,099,687	3,005	13,063	8.1	1,763	349,450	8.7
1937	1,279,160	3,505	15,507	9.7	3,723	363,030	9.8
1938	1,214,355	3,327	17,348	7.8	3,055	369,640	9.1
1939	1,264,962	3,466	18,483	7.3	2,400	380,390	9.2
1940	1,353,214	3,697	19,025	7.3	1,895	389,010	9.6
1941	1,402,228	3,842	19,589	7.4	1,967	399,960	9.7
1942	1,386,645	3,799	20,083	7.1	1,880	404,840	9.4
1943	1,505,613	4,125	20,064	7.5	1,487	407,170	10.2
1944	1,677,904	4,584	20,453	8.4	2,067	412,220	11.2
1945	1,713,655	4,695	20,827	8.4	2,087	415,750	11.3
1946	1,733,939	4,751	20,874	8.3	1,781	421,460	11.3
1947	1,856,987	5,088	21,488	8.9	2,471	426,280	12.0
1948	2,016,282	5,509	23,280	9.4	3,809	435,000	12.8
1949	1,846,000	5,058		7.9			



Higher Octane

Latest du Pont survey shows trend upward is continuing

WILMINGTON.—How the octane numbers of both regular and premium gasolines are creeping upward throughout the country is shown by the latest quarterly survey just completed by the petroleum chemicals division of E. I. du Pont de Nemours & Co.

This survey substantiates the conclusion that "the octane race is on again," as reported in The Oil and Gas Journal, January 19, page 30.

This is the second regular survey published by du Pont, but it includes data on certain cities obtained in earlier, unpublished surveys. It is based on laboratory tests of 552 samples of motor fuel, half regular and half premium grade, purchased at representative filling stations in 37 cities early in January 1950.

The tests covered 86 brands, believed to be representative of the range of quality offered in a particular area, and were taken from the same filling stations wherever possible.

The large accompanying table shows the tests of January compared with those of May 1949, based on the A.S.T.M. research method of rating. Findings of a similar survey made last October, giving both motor and research methods, were published in The Oil and Gas Journal, October 27, 1949, page 42.

An interesting aspect of this city-by-city study is the increase in octane numbers in areas which previously had been considerably below the national average in the octane ratings of gasoline marketed.

The chart at the top of this page shows how ratings have increased during the past 18 months in two fairly typical areas—San Francisco, which has always had a rather high average, and Chicago, which has been relatively low.

As the table reveals, there is still considerable variation in octane ratings among regions, but some of the historically low regions, particularly in the Middle West and Rocky Mountains, show a considerable advance in average ratings during recent months.

Unweighted averages of the ratings for all cities as reported by du Pont for both methods of measuring are shown below:

PREMIUM OCTANE NUMBER

Motor			Research		
May	Oct.	Jan.	May	Oct.	Jan.
80.1	79.7	80.6	87.2	88.2	88.8

REGULAR OCTANE NUMBER

Motor			Research		
May	Oct.	Jan.	May	Oct.	Jan.
76.2	76.4	76.8	81.5	82.1	82.7

TEL CONTENT
(cc. per gal.)

Premium			Regular		
May	Oct.	Jan.	May	Oct.	Jan.
2.01	2.04	1.96	1.53	1.65	1.48

COMPARISON OF MOTOR-GASOLINE SURVEYS FOR MAY 1949 AND JANUARY 1950
(Octane numbers by research method, arithmetical averages by cities)

	Premium			Regular		
	Octane number		TEL content (cc. gal.)	Octane number		TEL content (cc./gal.)
	May	January	January	May	January	January
Akron	87.7			83.4		
Amarillo	82.3	86.0	2.64	78.6	78.6	1.97
Atlanta	89.4	90.0	1.63	82.8	83.9	1.70
Bakersfield	87.1	89.0	2.58	79.1	81.5	1.83
Baltimore	89.2	90.8	1.52	84.2	85.3	1.40
Boston	90.1	91.1	1.68	84.8	85.6	1.41
Casper	85.8	88.6	1.18	79.8	81.6	0.89
Chicago	85.4	86.9	1.75	79.6	81.4	1.43
Cincinnati		90.2	1.53		84.8	1.27
Cleveland		89.9	1.74		84.9	1.00
Columbus		90.0	2.23		84.4	1.54
Corpus Christi	90.4	89.6	1.79	83.5	83.8	1.24
Dallas	85.3	89.0	2.63	82.4	82.9	2.22
Denver	84.9	88.6	1.31	78.3	81.9	0.95
Detroit	87.0	89.5	1.82	82.6	84.2	1.12
El Paso	81.6	84.2	2.52	76.2	76.7	1.12
Great Falls		85.2	1.81		81.4	1.03
Houston	89.2	90.0	1.79	83.4	83.8	1.45
Kansas City	85.4	88.2	2.34	79.9	81.7	1.55
Los Angeles	89.8	90.1	1.79	82.1	83.3	1.16
Louisville	87.0	89.5	2.12	81.6	83.5	2.30
Memphis	88.4	89.6	2.18	82.9	84.3	1.96
Milwaukee		88.0	1.92		80.6	1.36
Minneapolis	84.8	86.9	2.20	79.5	81.3	1.62
Montreal	86.9	88.0	2.14	82.3	82.5	1.17
Nashville		89.8	2.00		84.2	1.96
New Orleans	87.7	89.1	2.01	82.7	83.2	1.84
New York	88.7	90.3	1.52	84.1	84.9	1.26
Philadelphia	89.5	90.1	1.57	84.8	85.1	1.14
Pittsburgh	89.7	91.2	1.84	84.7	85.5	1.42
St. Louis	86.2	87.6	2.04	79.9	81.6	1.55
Salt Lake City	84.5	88.8	1.38	76.9	79.8	1.16
San Francisco	91.0	91.5	2.01	81.9	83.2	1.20
Seattle	90.1	91.2	1.65	81.4	83.4	0.92
Shreveport		87.7	2.71		82.8	2.24
Toronto	86.4	87.0	2.40	82.6	81.7	1.45
Tulsa	86.5	87.1	2.47	80.2	81.0	1.74
Wichita		85.9	1.88		80.9	1.86

Imports Roundup

Committee reports, recommendations converge on capital. NPC sees danger in trend; I.P.A.A. hopes for legislation

WASHINGTON.—The sharp increase in imports of crude and products, coupled with the continuing decline in exports, "has hurt the domestic oil industry." If imports continue to increase, without regard to the principle of only supplementing domestic production, "they will seriously damage the oil industry and thus adversely affect the national economy and the national security."

These warnings to the present administration were expressed in a report of the National Petroleum Council's committee on petroleum imports headed by Frank M. Porter, president of the Mid-Continent Oil and Gas Association.

Other developments.—Porter's report, however, was only one of a number of developments in the import fight during the week.

1. A full factual report of the import situation was submitted to President Truman by new Secretary of the Interior Oscar L. Chapman. Authoritative sources said, however, that Chapman made no recommendations and that the report was not discussed with the President at the time.

2. An even more complete report of the investigations of the House small business committee, together with a recommendation that the escape clauses of the reciprocal trade agreements be invoked and quantity restrictions imposed on imports, was laid before the President by Rep. Wright Patman of Texas, chairman of the committee, who visited the White House with Texas Railroad Commissioner Ernest O. Thompson.

3. J. F. Drake, chairman of the board of Gulf Oil Corp., announced at the NPC meeting that his company, following the lead of The Texas Co. and Standard Oil Co. (N. J.), will immediately reduce its imports of crude by not less than 12,000 bbl. daily from the average of the last quarter of 1949, and will be "guided in their planning by the principle that the volume of their imports should be related to expected changes in the total demand for oil in the United States."

Drake told the council he does not anticipate an early recurrence of the shortage conditions that gave rise to the general stepup in imports and that their recent acceleration is not properly to be interpreted as a trend.

4. Rep. Eugene J. Keogh of New York, chairman of the oil-imports subcommittee of the House small business committee, issued a statement expressing the belief that the present situation "offers an opportunity for again bringing in industry statesmanship," which, he recalled, in 1947-48 solved the threatened shortage of products, and promised his support if government sanction is necessary for any program that may be developed.

5. The executive committee of the Independent Petroleum Association of America and its state vice presidents discussed the various proposals that have been advanced to curb imports, and J. Ed Warren, president of the organization, said independent producers had hoped the problem could be solved by the industry but were giving up hope and looking to Congress.

A number of suggestions for action were tossed out, ranging from the Patman proposal and the $1.05 per barrel tax sought by Rep. Ed Gossett of Texas, to suggestions that imports be permitted at present tax rates only to the extent they were offset by exports, with higher taxes on imports over that level, or that importing companies be required to reduce their own domestic production by the amount of their entries of foreign oil.

NPC imports view.—In its report to the council, Porter's committee declared that "the importation (in 1949) of crude petroleum that was competitive with crude oil produced in the United States had an adverse economic impact on domestic oil production to the extent that such imports supplied markets which could have been supplied by domestic producers." It pointed out that for the domestic producing branch, when imports supply a part of those markets or diminish the total value of domestic crude oil, "imports naturally appear undesirable."

However, the report added, "it is difficult to demonstrate at what point imports cease to provide only proper assistance in building a reasonable amount of domestic productive capacity in excess of market demand and within maximum efficient rates and act instead to so restrict the market for or diminish the total value of domestic crude oil so as to curtail the rate of discovery and development of new oil fields in this country."

There was no substantial over-all curtailment in drilling in 1949, Porter said, because of drilling programs inaugurated "before the income of producers had been curtailed by continued reductions of allowables" and because of the additional availability of steel. But, he said, there was a steady decline in geophysical exploration, which may logically be expected to result in a decline in the number of wildcat wells to be drilled, which will cause a decline in the discovery of new petroleum reserves.

Porter emphasized that the committee recognized the part played by imports in the national economy and national security and did not wish to even imply that imports should be arbitrarily excluded, even in the case of foreign companies "so long as the same rights are accorded American nationals within the areas controlled by the country of such foreign nationals."

NPC's British-ban view.—British trade and exchange control practices which are eliminating American companies from the international oil trade, however, although initiated under the guise of saving British foreign exchange resources, appear actually to be designed to obtain long-term commercial advantages for the British and British-Dutch oil companies at the expense of the American industry, he said.

"The data indicate that the British and British-Dutch oil companies are, and propose to continue, expanding their facilities to produce and refine oil in amounts substantially in excess of the amounts they could reasonably expect to sell on a competitive basis," Porter told the council. "All oil produced by the British and British-Dutch companies which they cannot sell on a competitive basis the British government characterizes as 'surplus oil.' This 'surplus oil' is created even though the new facilities to produce the oil duplicate existing facilities owned by American oil companies and thus waste British and, through the Marshall Plan, American economic resources; and even though this forced production of 'surplus oil' can be marketed only by trade and exchange control discrimination by the British government.

"The British policies, if continued, could compel the petroleum industry of this nation to surrender the international oil trade to the British, because the dollar markets of the United States could not possibly absorb sufficient imports to satisfy the concession obligations of the American owned foreign concessions, without demoralizing the domestic industry with consequent serious injury

to the domestic economy and national security.

"The committee finds that participation by American nationals in the development of world oil resources is in the interests of the United States and of all nations. The committee believes that, in the present situation, the United States Government should take steps to permit American oil companies to compete in the international oil trade free of the unsurmountable obstacles presented by the present trade and exchange control discriminations being arbitrarily imposed by the British government."

Patman's attitude.—Patman was even more explicit in his report to the President, declaring that United States oil, "relatively speaking," no longer plays a part in world oil markets, while the domestic market has been invaded by foreign oil beyond supplementary requirements, resulting in production cut-backs which will have damaging impact on the domestic industry.

"The importers show inadequate efforts to decrease imports and, to the contrary, are directing their activities to ever-increasing quantities out of proportion to any increases in domestic demands," he asserted.

"The problem is acute and, in my judgment, unless some immediate action is taken to curb imports, serious consequences will inevitably follow."

The quantity quotas on imports, he said, should be at a level which will insure that they supplement but do not supplant domestic production.

Britain's Bad Guess

British figured oil-imports ban would bring nothing but "regrets"; President "displeased" by contents of letter

WASHINGTON.—British authorities last December apparently did not anticipate the amount of reaction which would follow adoption of the policy of substituting sterling for dollar oil throughout the Empire, it is indicated by a letter then written by the British Colonial Office, a copy of which was read last week at the National Petroleum Council meeting and also was read before President Truman.

In that letter, explaining what was under consideration and why it was proposed to embargo dollar oil, it was stated that an explanation had already been made to the United States in the course of the oil talks which followed the monetary conference in Washington last September.

"The Americans have, as expected, not gone beyond expressing regret at the proposal and steps have now been taken to put the scheme into effect in the United Kingdom, and to obtain the cooperation of the dominion governments," it was declared.

The American companies, the letter discloses, would be left to decide whether they would make good the reduction in their imports of dollar oil by purchases from nondollar sources, which the British companies said were "in principle" willing to sell and, it was added, "should an American distributing company decide to curtail its trade, British companies or indeed other American companies should have little difficulty in taking over the additional business."

"Anything more than minor curtailment of this kind appears unlikely, judging by the attitude of the head offices of United States companies in the general discussions the Ministry of Fuel and Power have had with them," it was added.

It was clear from the tenor of the letter that the British Government did not expect the strong reaction which followed announcement of its order in this country. National Petroleum Council members were openly disturbed over the apparent acquiescence of State Department and it was rumored that the President expressed displeasure and told members of the Congress who discussed the matter with him that he would do something about it.

There was also the possibility that disclosure of the letter might have some influence with Congress, where House Speaker Sam Rayburn said last week there would be no legislation on imports this session.

Meanwhile the British-American oil talks have again been temporarily suspended while English officals return to London for further instruction from their government.

In Washington the problem has been elevated to cabinet level and will be laid before President Truman for consideration.

Reports in trade circles represent the companies as believing their fight against the order which was to have curtailed the activities of the American companies beginning January 1, is having some effect and that it may be modified or at least held up for a time for further exploration of the problem.

Former Journal Editor Dies

J. McINTYRE

James McIntyre, 77, editor of The Oil and Gas Journal from 1921 to 1934 and a member of the editorial staff for 23 years, died January 31 at his home in Tulsa. He retired from active duty with the Journal in 1940 after serving as consulting editor for a period of several years. He assisted on a part-time basis during a part of the war period.

McIntyre at the time of his retirement was known as the "dean" of oil writers. His association with the oil business began in 1886 as a messenger boy in the Bradford Oil Exchange during a period when crude oil was bought and sold in much the same manner as grains are traded at this time. He learned telegraphy at that time and joined the reportorial staff of the Buffalo (N. Y.) Express in 1894.

In 1895 he joined the staff of the Bradford (Pa.) Evening Star and later became managing editor of that newspaper and its successor the Star-Record. He did a great amount of oil writing during this period and became widely known in the Pennsylvania area.

He joined The Oil and Gas Journal staff in 1917 as field correspondent for Oklahoma and Kansas. He is credited with establishing standards in reporting field activities which are now generally accepted by oil writers. Stressing accuracy and completeness, he gained the confidence and cooperation of operators in all parts of the oil country in developing field reports and associated information. As editor of the Journal he directed its editorial activities during a period of consistent growth.

He is survived by two daughters, Mrs. J. Dean Tasker, Tulsa, and Mrs. Vincent T. McGinty, Utica, N. Y. Funeral services were held in Tulsa February 2.

Tax-Bill Criticism

Vursell tells House Truman Plan will ruin independents

WASHINGTON.—Adoption of President Truman's recommendation for reduction of the depletion allowance "will drive all independent oil producers in the nation out of business," Congress was told last week by Rep. Charles W. Vursell of Illinois.

Vursell, a Republican, accused the President of making the recommendation "to satisfy the ravenous appetite of this administration to secure more taxes rather than to practice economy and cut the cost of government," and charged the result of depletion reduction would "favor big monopoly."

"Independent producers throughout my district tell me that if the proposed attempt to tamper with the depletion allowance is successful they will have no choice but to get out of the business," he told the House. "In selling they will be at the mercy of a few buyers consisting of the major oil companies and large financial corporations. Such a move which will produce less oil would not only throw a half million out of work but would cause the price of oil to increase to the consuming public.

"These are the exact conditions that will follow unless this Congress defeats the attempt of the tax authorities to grab this power.

"These efforts to hamstring the oil producing business have been tried before," Vursell said. "Congress has each time refused to let it happen. The weight of the evidence should again bury those who would sacrifice this industry so that their insatiable appetite for new tax can be gratified."

Increased crude costs.—Industry men in Washington for the National Petroleum Council meeting expressed the opinion that reduction or elimination of the depletion allowance would make inevitable an increase in the cost of crude as an offsetting measure. They pointed out that by the time the finished products reached the public the consumer would pay far more than the amount of tax derived by the Government.

It was pointed out that the limitation upon the depletion allowance to 50 per cent of the taxpayer's net income from his wells serves as a brake upon the amount of the deduction, and oil men estimated that actually the allowance probably averages between 19 and 20 per cent for the industry as a whole.

Many appeared more concerned over the President's attack on the assignment of intangible costs to expense, a matter which was submerged in the general outcry against reduction of the depletion allowance.

WATCHING WASHINGTON

Bertram F. Linz

King Coal Skids

National Security Resources Board officials who recently have indicated concern over the coal situation have considerable basis for their fears that the economy soon may be so tied to oil and gas as to create an over-all fuel problem in the event of another war.

That the coal industry in the past 2 years has steadily lost markets to oil and gas is shown conclusively in statistics of the Bureau of Mines.

Whereas in 1948, on a heat-content basis, coal provided 50 per cent of the total energy used in the United States, it accounted for only 38.5 per cent last year, whereas oil and gas increased their combined contribution from 46.1 to 56.5 per cent in the same period, according to Bureau Director James Boyd.

In three major fields, coal has badly lost ground. Railroad consumption last year was less than 70,000,000 tons, a drop of 37 per cent from the 1947 consumption of 109,000,000 tons. The substantial increase in coal consumption by electric-power utilities which occurred after the war has halted and many power plants already have switched and others are switching exclusively or predominantly to oil and gas.

In the heating field, shipments of coal-burning warm-air furnaces during the first 10 months of 1949 were 47 per cent under those of 1948, while shipments of oil-burning furnaces increased 13 per cent and those of gas-burning furnaces increased by 48 per cent. During the same period oil-burner shipments increased 39 per cent while factory sales of mechanical coal stokers dropped 60 per cent.

Refineries Needn't Move

Defense officials have jumped out from under charges that they are supporting suggestions for the relocation of refineries and other vital industrial installations as a guard against possible enemy air attack, which threatens to become an issue with members of Congress from the coastal and border states.

All the Defense Department seeks, according to Munitions Board Chairman Hubert E. Howard, is to encourage the separation of vital facilities by at least a few miles, which sort of pulls the rug out from under the Mid-Continent Industrial Council which is trying to induce industries to move inland for protection (*The Oil and Gas Journal, January 19, page 33*).

Military men are particularly outraged by charges in Congress that they are writing off the outer areas of the country most easily reachable by an enemy.

"The Department of Defense is planning the protection and defense of the entire United States and is not planning the defense of any one area to the detriment of another," Howard asserted.

Suggestions for dispersal of industry, it is explained, were based on the known effects of the atom bomb, and incidentally those calculations now will have to be revised in the light of the potentialities of the many times more powerful hydrogen bomb, which it has been claimed can devastate the area within a radius of 100 miles.

More to the point, defense officials themselves point out that there is no authority in the Government to direct private industry to move its plants, and the serious social and economic factors involved make any ideas of a general relocation of industry nothing more than a pipe dream.

Depletion Defection

Reaction to President Truman's proposal to eliminate the depletion allowance was prompt, violent, and adverse, and left little doubt that Congress will determine what to do about taxes, without too much regard for the President's views.

Members from the oil states were quick to state their opposition to wiping out the allowance, and their views echoed those of oil producers who immediately launched a counterattack against the President, contending that it would sharply curtail exploratory and drilling operations, discourage secondary recovery, and force the abandonment of small wells with consequent loss of large reserves.

The Treasury Department has been gunning for the depletion allowance for a number of years, and on several occasions has asked Congress to reduce or eliminate it. But every time, after going into the question thoroughly, the House ways and means committee has rejected the department's suggestions. There is nothing to indicate that it will take a different position this year. The situation, however, will be clearer after the committee holds hearings on this phase of the President's recommendations in the near future.

Gas Line From Canada

Westcoast Transmission ready to begin work on 1,025-mile line out of Alberta; only permit from province is needed

Paul Reed

A PIPE line to supply Canadian natural gas to cities of the north Pacific coast of the United States will be constructed by Westcoast Transmission Co. Limited, Calgary, as soon as the necessary permit is obtained from the provincial government of Alberta.

Application to export gas from the province is now being considered by the Petroleum and Natural Gas Board of Alberta. Hearings began January 30 with a prospect of lasting about 15 days, and a decision is expected shortly thereafter.

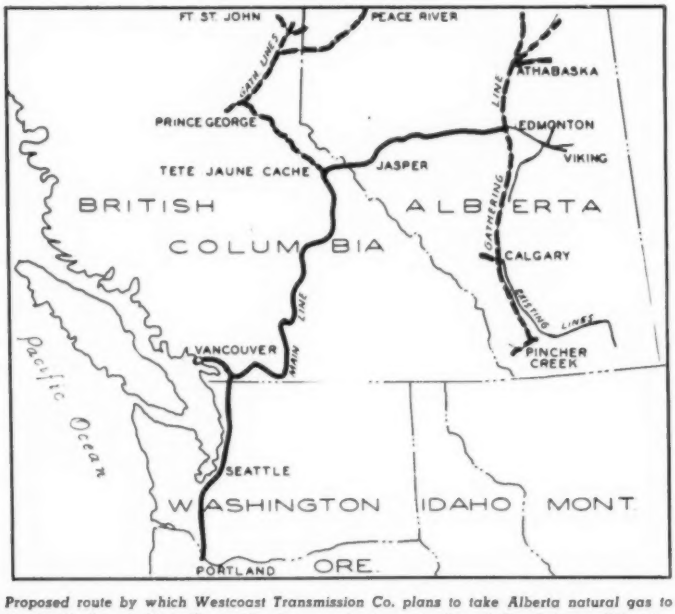
The proposed trunk line would have a length of 1,025 miles, starting at Edmonton, Alta., and running to the areas of Vancouver, B. C., Seattle, Wash., and Portland, Ore. Other cities adjacent to the route in British Columbia and Washington also would be served.

Route for the line, selected by the engineering firm of Ford, Bacon & Davis, Inc., is through Yellowhead Pass in the Rocky Mountains west of Edmonton, then south and west through the Cariboo country and the Fraser River valley to Puget Sound, and south into Washington and Oregon.

Preliminary planning involves a line probably 26 in. in diameter for a major portion of its length, with a capacity of about 300,000,000 cu. ft. daily, and costing approximately $114,000,000. The company states it is prepared to begin construction work as soon as official approval is obtained.

Sponsorship.—Westcoast Transmission Co. Limited was incorporated by special act of the Parliament of the Dominion of Canada April 30, 1949, with authority to transport oil and natural gas from Alberta to British Columbia and the United States, but it may not begin operations without an export permit from the Alberta government.

The company was organized by Pacific Petroleums, Ltd., and is headed by Frank M. McMahon of Calgary. Sunray Oil Corp., Tulsa, owns about 25 per cent of the stock of Pacific Petroleums, Ltd., and is associated with Westcoast Transmission and other activities affiliated with Pacific Petroleums. The group controls considerable production of oil and gas in Alberta.



Proposed route by which Westcoast Transmission Co. plans to take Alberta natural gas to Pacific Northwest cities. Heavy line is approximate route of trunk line between Edmonton and Portland. Dotted lines are gathering system which will be built if grid system is not constructed. Present gas lines serving Calgary and Edmonton are shown as thin solid lines.

Gathering systems.—Supply of gas for the proposed line is currently involved in a rather complicated situation within the province of Alberta. Westcoast has a plan to construct its own gathering system, but this plan may be modified if gas can be obtained from either of two pending proposals to construct "grid" systems connecting several Alberta gas fields and larger cities.

A subsidiary company, with the confusing similar name o. Westcoast Transmission Co., Ltd., was incorporated under Alberta charter in March 1949. This provincial firm has proposed to construct the gathering systems which will be required to supply the dominion company with its gas supply for export to the coast market.

The Westcoast plans involve three separate gathering systems:

1. From Pincher Creek field in southwestern Alberta via Calgary and Red Deer to Edmonton, possibly with a feeder from Jumping Pound field west of Calgary.

2. From several fields north of Edmonton into the Edmonton terminus of the trunk line. These first two systems would total approximately 426 miles.

3. An extensive system in the Peace River country of Alberta and British Columbia, with the main gathering line originating in the vicinity of Dawson Creek and proceeding southwest through Monkman Pass, near Prince George, along the Fraser Valley, to join the trunk line at Tete Jaune Cache just west of Yellowhead Pass.

So-called grid systems within Alberta are proposed by two companies—Interfield Gas Lines, Ltd., and Alberta Natural Gas Grid, Ltd.

Interfield Gas Lines, Limited, is an independent company sponsored by some officials of Canadian Western Natural Gas Co. and Northwest Utilities for the purpose of connecting gas fields of the province. The Interfield line would commence in the southwestern part of Alberta, proceed from there to Lethbridge, gathering gas from Pincher Creek, run north to Calgary, take gas from Jumping Pound field, thence north to Edmonton, and hook into the system which now brings gas from Viking-Kinsella field to Edmonton. According to reports from the officials of that company the cost of such a system would be so high that it would be impracticable unless the export of gas be permitted by the provincial government.

The Interfield gathering system

would be for the purpose of gathering gas throughout the province for sale to exporting companies and at the same time for supplementing supplies to present markets.

It is possible also that Interfield may extend its gathering lines to the fields north of Edmonton which would possibly eliminate the necessity of Westcoast constructing that gathering system. Interfield expects, therefore, to be able to sell gas to whichever company acquires the right to export the gas to the Pacific coast or easterly to Winnipeg, or both companies if both projects are proceeded with.

Alberta Natural Gas Grid, Ltd., is a subsidiary company of Northwest Natural Gas Co., which is also applying for the right to transport gas from Alberta to the Pacific coast. Northwest proposes to transport gas out of the southwesterly corner of Alberta, across the states of Idaho and Washington, and to provide Vancouver with gas through a branch line.

The Westcoast application seems to be the more favorably accepted in western Canada at the present time because it would serve Canadian territory first, though it is conceded that without the economic advantage of markets south of the Canadian border, the demand for gas in the Vancouver area is insufficient to warrant the construction of a trunk line to the coast.

According to present Westcoast estimates, reserves to serve the project amount to 7 trillion cubic feet. Reservoir engineering for Westcoast has been handled by Ralph Davis, Pittsburgh.

While the major part of the financing of the Westcoast undertaking will be done in the United States, an effort is being made to raise as much of the capital as possible in Canada. Financing is to be handled by Eastman, Dillon & Co., New York, and associated Canadian firms.

Leasing Rules

Changes expected after Huntington Beach offer

LOS ANGELES.—A change in offshore leasing regulations is expected to result from a meeting of the State Lands Commission February 11 in Sacramento.

The effect of regulations at present is to limit bidding for offshore leases to those companies having onshore sites from which wells under the offshore leases can be drilled or companies able to erect a platform or provide a land fill and commence drilling within 45 days of the lease date.

Observers believe bids submitted recently on offshore parcels in the Huntington Beach area will be rejected and that the commission will revise the regulations.

In the Huntington Beach case, only Signal Oil & Gas Co. and Southwest Exploration Co. were able to enter a valid bid. These companies now hold the only available locations suitable for reaching the offshore parcels offered.

Almost all other companies interested in obtaining drilling rights on the properties refrained from filing bids because they considered it impossible to comply fully with the regulations.

Shell Oil Co. and Union Oil Co. did enter a joint bid. With their offer they pointed out that they were willing to drill from filled land or from land the state might make available through condemnation proceedings. It was also pointed out that 45 days was insufficient time to prepare a filled-land drill site.

The bid of these two companies, incidently, is reported to be approximately half again greater than the bids offered by Signal and Southwest Exploration.

Humble Oil & Refining Co. has stated it would enter a bid, contingent on a change in the regulations similar to those noted by Shell and Union.

An alternative to rejection of all bids could be acceptance of the Shell-Union high bid, followed by state condemnation action to provide the companies with easements and right-of-way sufficient to operate an onshore drilling site.

The tidelands parcels involved have been made available for drilling through an agreement between the State of California and the Department of the Interior. The agreement was reached after it had been claimed that present operations at Huntington Beach were draining oil from these areas.

Placerita Gas Wastage

LOS ANGELES.—Nature may forestall efforts on the part of the State of California to prevent gas wastage in Placerita Canyon field.

Soon after California announced that it would halt gas wastage, Pacific Coast Gasoline Co. announced that it was making contracts for taking gas from the field, and would, with Lomita Gasoline Co., construct a compressor plant.

However, while these plans are progressing the need for such a plant is rapidly diminishing. Volume of gas has fallen off until there are now no flowing wells in the field. Also, the gas is virtually worthless, since its B.t.u. content is below that required for household use. Too, increasingly large amounts of carbon dioxide are being produced. In one case, at least, the CO_2 content measured 50 per cent.

The state has caused a change in gas-disposal practices. Instead of venting from receiving tanks, the operators are now flaring the produced gas.

GULF COAST

Tax Outlook

Mississippi bill proposes increase in severance tax

JACKSON.—Observers of the Mississippi Legislature, which has been in regular session since January 3, believe that the lawmakers are "economy minded" and that no new taxes will be levied on the oil industry.

Gov. Fielding L. Wright has asked for retrenchment and economy from the legislators. In addition, he has requested the appointment of a committee to draft an organization plan for the state's administrative setup. He did not ask for the increase of 2 cents per gallon in the gasoline tax, which failed at a recent special session. The governor's budget is $99,000,000, while the state's anticipated revenue is $110,640,000.

Of the more than 300 bills introduced thus far, there is one major bill adversely affecting the industry. House Bill 122 provides for an increase in the present severance tax on oil. The present rate is 6 cents per barrel when the price of oil is below $1, and 6 per cent when the price is over $1. This bill calls for an increase to 8 cents and 8 per cent.

The severance tax on oil already produces a large portion of the state's revenue. Since the tax was first levied in March of 1944, the industry has paid the state $18,912,019 (as of November 1, 1949). In October, the latest month for which a report is available, the severance tax brought the state $446,621 on 3,067,050 bbl. of oil.

Other bills introduced to date, which are of interest to the industry, include:

H.B. 65—Provides that title and ownership of the oil, gas, and minerals in land will revert to the owner of the surface land after 20 years.

H.B. 126—Provides authority for state boards, state officers, state agents and boards and officers of all political subdivisons and agencies of the state who manage and control mineral and royalty interests to execute agreements for cooperative development and operation of such interests.

S.B. 108—Provides a 10-year prescription on minerals and provides a tax on mineral and royalty conveyances.

H.B. 153—Authorizes commissioners of drainage districts to lease lands for oil, gas, and mineral exploration and development.

H.B. 288—Provides annual salaries for members ($2,400) and chairman ($3,000) of state oil and gas board (now per diem).

H.B. 289—Authorizes state oil and gas board to appoint an attorney;

increase effective time of emergency orders from 15 to 45 days, and authorizes the board to require integration of interests for drilling units without acreage limitation.

Lacy Leases Bought

HOUSTON.—Hydrocarbon Production Co., Inc., a newly formed affiliate of Columbian Carbon Co., Houston, has purchased for a reported $1,500,000 the 23,000 acres of oil and gas leases in Southwest Texas of Rogers Lacy Production Co.

Included in the deal is Lacy gas field, Hidalgo County, which has five "produceable" gas wells.

Hydrocarbon Production has a contract to supply 20,000,000 cu. ft. of gas daily for the 1,840-mile Rio Grande Valley-New York City pipe line being built by Transcontinental Gas Pipe Line Co. The line, which will have its southern terminus in Lacy field, is scheduled for completion by October 1.

To meet its commitments, Hydrocarbon Production plans a drilling program in the field, which now is supplying a small amount of gas to Rio Grande Valley Pipe Line Co.

The 23,000 acres of leases which Hydrocarbon has purchased are in the western part of Cameron County and the eastern part of Hidalgo County. Much of the land is owned in fee by the estate and heirs of Lacy, who died about 2 years ago.

Officers of Hydrocarbon, a Delaware corporation, include Carl Kyser, president, and T. R. Goebel and H. S. Cole, vice presidents. Kyser is also president of Columbian Carbon Co.

Recovery Advisors

Louisiana group formed to solve production problems

SHREVEPORT.—Fourteen operators are represented on the newly-formed Louisiana Secondary Recovery Advisory Committee, a voluntary group which will coordinate secondary-recovery problems on a statewide basis.

The new 18-man committee was appointed by Raymond B. Hamilton, pressure-maintenance supervisor for the state and manager of the Shreveport conservation district.

Hamilton named the group with the approval of S. L. Digby, state conservation commissioner. It is composed of petroleum engineers and geologists with companies interested in Louisiana production.

Hamilton emphasizes that the committee is a voluntary, cooperative group. The group chairman announced a five-point program:

1. To collect and study current and ancient production statistics and well records in all areas having secondary-recovery possibilities, together with collection and periodic publication of secondary-recovery statistics.

2. To coordinate activities with other organizations interested in secondary-recovery work.

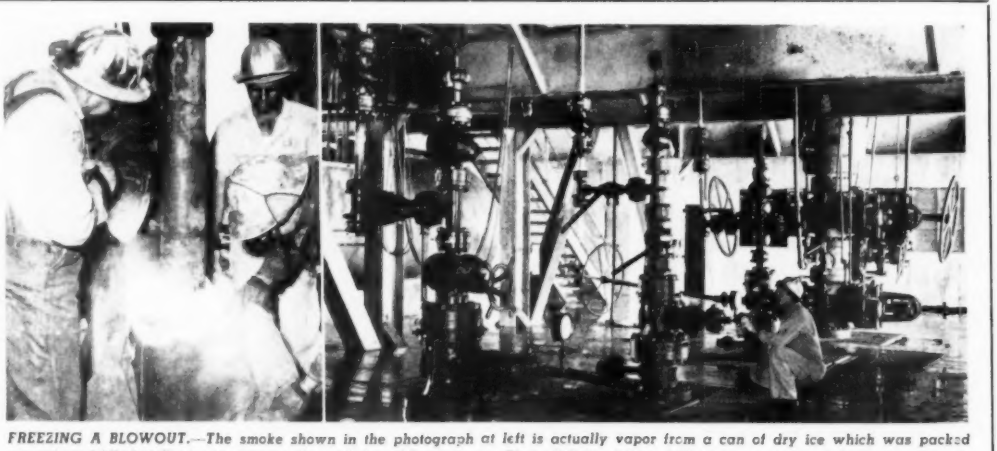
3. To cope with the oil and gas industry's secondary-recovery problems, with the primary purpose being to seek maximum production of oil and gas in all sands from all fields. Firms participating in the program will submit their secondary-recovery problems to the committee, which will decide on the best method of recovery.

4. To disseminate information which will demonstrate to the public that there is an obligation to produce oil efficiently and in the best interest of the nation; that this obligation is being met through voluntary, cooperative effort on the part of those concerned with the production of oil.

5. To make available information which will promote adoption of secondary-recovery methods best suited to particular localities.

An organizational meeting of the committee was held in Shreveport Monday.

Members of the group are D. W. Akins, Jr., Ohio Oil Co., Shreveport; W. D. Beach, Gulf Refining Co., Shreveport; Ben F. Carter, Union Producing Co., Shreveport; Bobert B. Cater, Jr., Atlantic Refining Co., Magnolia, Ark.; Benjamin C. Craft, Louisiana State University, Baton Rouge; I. William Fox, Midstates Oil Corp., Shreveport; W. C. Fullilove, Jr., R. E. Allison Drilling Co., Shreveport; R. O. Garrett, Arkansas Fuel Oil Co., Shreveport; G. C. Hollinger, Carter Oil Co., Shreveport; W. L. Horner, Barnsdall Oil Co., Tulsa; F. L. Nelson, Stanolind Oil & Gas Co., Lake Charles; James H. Tillery, Jr., Department of Conservation, Baton Rouge; Gladstone Stewart, Jr., Shell Oil Co., New Orleans; A. L. Vitter, Jr., The California Co., New Orleans; J. A. Walker, Magnolia Petroleum Co., Shreveport; Nelson W. Williams, Core Laboratories, Inc., Dallas; and Barney L. Francis, The Texas Co.



***FREEZING A BLOWOUT.**—The smoke shown in the photograph at left is actually vapor from a can of dry ice which was packed around mud-filled drill pipe to prevent the well from blowing out. About 540 ft. of 5-in. drill pipe was in the hole during a workover operation when the well began kicking. Three blowout preventers were immediately closed around the drill pipe, and pressure in the pipe at the surface climbed to about 800 psi. The dry ice idea was hit upon to enable the operator to lengthen the string of drill pipe and kill the well. During the first two attempts fresh water was used in the pipe, but bubbling gas and oil kept it from freezing. On the third attempt heavy mud was used and dry ice kept in contact with the pipe for a period of 2 hours. Upon bleeding the pressure above the point of application the mud was found to be frozen solid. The top joint of pipe was then unscrewed, a positive shut-off plug installed, and the rest of the string made up and lowered to the bottom where heavy mud was pumped down the drill pipe to control the well. The well in which this operation took place is that shown at left in the photograph at right. It is the discovery well of Humble Oil & Refining Co.'s field off Grand Isle, La., in the Gulf of Mexico.*

New Production Method

Atlantic says gas injection under "much higher" pressures may result in recovery of 90 per cent of reservoir oil

PHILADELPHIA. — Greater recovery of oil is promised by a new method of reservoir operation just developed by Atlantic Refining Co.

The method involves the injection of gas at higher pressures than have ever before been used in pressure-maintenance and recycling operations.

At the proposed high pressures the gas and oil dissolve into each other to form a homogeneous phase which flows easily through the pores of the oil-bearing formation.

The scheme is still in the laboratory stage, but field tests will be made soon. Pilot-plant studies indicate that the method will make it possible to recover as much as 90 per cent of the oil in place, compared with the present average of about 45 per cent.

The company has not yet released information on the pressures proposed to be used, nor on operating procedures and engineering details.

Atlantic developed the new method at its production-research laboratories in Dallas. The announcement follows 2 years of intensive study of reservoir engineering and problems of oil recovery.

Background. — In explaining these studies, the company stated:

"Despite the petroleum engineer's best efforts to make the oil flow through the rock formation to the well bore and thence to the surface, over one-half of the oil, in many cases, remains permanently trapped as drops of liquid in the fine pores of the reservoir rock.

"The surface tensions between the boundaries of the different fluids present (oil-gas-water), coupled with the 'capillary' effect of the fine pores and passages in the rock, result in the formation of separate small drops of liquid which are easily trapped and will not flow.

"In operating a reservoir, using present techniques, the engineer carefully controls the flow of gas, water, and oil to get a maximum oil displacement with the aid of the native gas and water. He sometimes floods the oil-bearing rock with air, gas, or water in a partially successful attempt at freeing some of the trapped droplets of oil.

"The injection of gas into petroleum reservoirs to improve recovery has been practiced in two ways. It has been injected into the shallower crude-oil reservoirs, which are under relatively low pressure, to help sweep out some of the liquid crude oil remaining trapped. In the case of the deeper 'distillate' fields, gas produced is frequently returned to the reservoir to maintain the high pressure and prevent the distillate from condensing to easily trapped drops of liquid.

"Atlantic's scientists have discovered that crude oil and hydrocarbon-gas mixtures, when under high pressure, possess properties previously unknown. With this knowledge, they have developed an operating technique that is proving, in the laboratory, to be a practicable means for recovering nearly all the oil from an underground reservoir. They have learned how to use high-pressure hydrocarbon gases to increase the recovery of crude oil, and have demonstrated in laboratory displacement experiments the recovery of as much as 90 per cent of the oil."

How it works. — The new operating technique involves the injection of a hydrocarbon gas into a reservoir containing crude oil under conditions which promote the mutual solution of the crude oil and the gas. The gas is injected so that it will flow through the reservoir and contact the trapped oil.

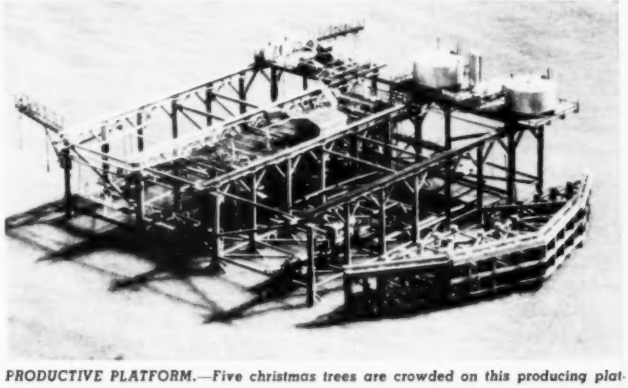
The crude oil tends to dissolve in the high-pressure gas and the gas tends to dissolve in the oil, swelling it far beyond the dimensions of the pores which imprison it. Under certain—and now known—conditions of pressure, gas composition, and crude-oil composition, a single homogeneous phase is formed which flows easily through the pores of the rock.

Even under conditions when both gas and liquid phases still exist, the very much larger volume of the liquid phase results in a large increase in recovery. The liquid volume may increase as much as 30 times its original volume.

This process differs from present gas-injection practices in crude-oil reservoirs in that higher pressures are required to obtain these beneficial results. The important advance claimed by Atlantic's technologists is the knowledge of the physical principles involved and the resultant ability to:

1. More accurately forecast the magnitude of the higher recoveries of crude oil that can be realized by this technique;
2. Plan the operation of a reservoir to attain maximum economic recovery of crude oil;
3. Economically justify the use of large volumes of the proper hydrocarbon gas for this purpose as well as justify the expensive gas compressing equipment required.

There may be justification in some



***PRODUCTIVE PLATFORM.**—Five christmas trees are crowded on this producing platform 5 miles out in the Gulf of Mexico off the coast of Plaquemines Parish, South Louisiana. Discovered by The California Co. in August 1948, this productive area is officially described as Main Pass Block 69 field. Since discovery, 11 wells have been drilled; one was temporarily abandoned and two cratered out. The California Co. has five producers and Shell Oil Co. has three. The field recently had a daily allowable of 1,518 bbl., and cumulative production then was 163,000 bbl. The wells are producing from sands at 5,800 ft. and 8,200 ft. Main Pass Block 69 is the only offshore field to date with more than one operator. Oil is carried to shore by one of the two offshore pipe lines now in existence in the Gulf.*

cases, it is stated, for raising the pressure of a reservoir above its original pressure to obtain the maximum recovery. The research work on this new method was done under the direction of L. P. Whorton, director, and E. R. Brownscombe, associate director, of Atlantic's Dallas laboratories. The announcement was made in Philadelphia by H. W. Field, vice president and general manager of research and development, and L. Laskaris, director of crude-oil production research.

These officials stated that the cost of the new method will vary with different reservoirs and under a wide range of operating conditions, and probably will range from $1 to $3 per barrel. The high pressures mean expensive compressing equipment, and in some fields additional injection wells must be drilled.

The high pressures required will likely limit application of the method for the deeper fields. Atlantic engineers are now making a survey to determine reservoirs best suited to field tests of the new technique.

Index Ready Now

The complete editorial index of The Oil and Gas Journal for 1949 is now ready and will be sent without charge to all subscribers requesting a copy. This 48-page index is bound separately and is completely crossindexed. Address requests to Circulation Department, Box 1260, Tulsa.

MID-CONTINENT

Small-Refiner Losses

W.P.R.A. survey shows 4,000 to 8,000-bbl. refineries in Mid-Continent still losing about 17 cents per barrel

TULSA. — Smaller refiners in the Mid-Continent area are still losing money, according to another survey by the Western Petroleum Refiners Association.

Operating data are for the month of December and cover a group of plants located in Kansas, Oklahoma, and North Texas. These refineries have crude throughput capacities ranging from 4,000 to 8,000 bbl. daily and operate with skimming and thermal cracking equipment. Product prices used are the "lows" of published Group 3 spot quotations for about the middle of January.

According to the survey by W.P.R.A., total realization from a barrel of crude by these refineries amounted to about $3.25. Average crude cost—posted prices plus transportation to the plants—was $2.79 per barrel. Manufacturing, administrative, and selling expense averaged a little more than 62 cents per barrel, resulting in a net loss of about 17 cents for each barrel of crude processed.

This survey is similar to the study made by the association early last summer. *(See The Oil and Gas Journal, May 19, page 167).* Since the latest tabulation does not include data from refineries producing asphalt, it is more nearly comparable with Table 2 of the earlier survey which indicated a loss of 16.66 cents per barrel at that time.

The product realization trend chart for Mid-Continent refineries, published weekly in the statistics section of the Journal, has shown some improvement in total realization in the past few weeks. The data for this chart are weekly runs and production of the four major products as reported by American Petroleum Institute for all Mid-Continent refineries and the average of Group 3 spot-market quotations for regular gasoline, kerosine, No. 2 fuel, and residual fuel as published in the Journal. Minor products and loss are averaged at residual prices.

While the Journal's chart was designed to show trends in refinery realization, the latest figure, $3.21 for the week of January 21, differs very little from the total in the more detailed study made by W.P.R.A.

AVERAGE REALIZATION AND COST FOR SMALL MID-CONTINENT REFINERIES

	Per cent yield	Gallons from bbl.	Price per gallon	Total realization
Gasoline—				
Premium	12.04	5.057	$.10375	$ .5247
Regular	40.16	16.867	.09625	1.6234
Kerosine	2.40	1.008	.08250	.0832
No. 1 distillate and furnace oil	9.60	4.032	.08000	.3226
No. 2 distillate and furnace oil	11.40	4.788	.07375	.3531
Diesel	2.00	.840	.08000	.0672
Residual	16.60	6.972	.03214	.2241
Propane and gases	2.00	.840	.05500	.0462
Loss	3.80	1.596		
Total realization	100.00	42.000		$3.2445
Delivered cost of crude per barrel				$2.7900
Manufacturing expense				.4196
Administrative and selling expense				.2060
Total cost				$3.4156
Loss				$ .1711

Gas Company Sold

Fin-Ker Oil and Gas Production Co. has been acquired by Kearney Gas Production Co. and Deerfield Gas Production Co.

The sale involves 42,000 developed acres and 8,000 undeveloped acres of gas leases in Hugoton field, Kansas. Production from this acreage is taken, with minor exceptions, by Kansas-Nebraska Natural Gas Co., Inc. The contract with Kansas-Nebraska provides for drilling the undeveloped acreage.

ASSOCIATIONS

A.I.M.E. Meeting

NEW YORK.—Production economics and technology will provide the central theme of the annual meeting here February 11-15 of the petroleum branch of the American Institute of Mining and Metallurgical Engineers.

Texas Railroad Commissioner Ernest O. Thompson and Jerry A. Cogan, manager of coordination and economics for Standard Oil Co. (N. J.), will be principal speakers on economic aspects. Thompson will discuss the role of state regulation in conservation, and Cogan will present an analysis of the current and future crude-oil supply and demand situation.

The technology session will be in seminar form, with key speakers including R. W. French, Jr., vice president of Standard Oil Co. of Ohio, Cleveland; C. V. Millikan, Amerada Petroleum Corp., Tulsa; and Morris Muskat, Gulf Research & Development Co., Pittsburgh. They will present, respectively, the viewpoints of management, engineering, and research.

Highlights of worldwide exploration, development, and production activities will be covered in another session February 14.

Discoveries ahead
YOUNGSTERS soon discover what the old timers have long since learned: Youngstown Oil Country Tubular Goods are right. Always dependable, consistently satisfactory, Youngstown drill pipe, casing, tubing and line pipe have served the petroleum industry for nearly half a century--in record-setting performances and normal operations--wherever men drill for oil.
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INTERNATIONAL

LATIN AMERICA

Changed Oil Policy

Venezuelan Government reported ready to consider new concessions and invite entry of additional companies

THE Venezuelan Government commission studying a new oil policy has submitted its report to the government, and while not yet made public, it is widely reported to recommend that additional concessions be granted.

It is expected that the government will take some action in the next 3 or 4 months. Concessions were last granted in Venezuela in 1944. West of Lake Maracaibo particularly there are open areas which are now close to production.

There also is a belief that the government in granting new concessions will attempt to broaden the base of participation in the Venezuelan industry by encouraging new companies not now in the country. These would be responsible well-financed companies capable of undertaking the expensive Venezuelan operations.

Policy change possible.—It is pointed out that the present governing regime in Venezuela holds ample authority under the existing 1943 oil law to carry out such a policy. This allows areas to be awarded to whomever the government feels will best serve the country's interests.

This policy of favoring a wider participation in Venezuelan oil would, of course, not involve any change in the conditions under which the present companies are carrying on their operations. This was brought out in an interview in Washington several months ago by Dr. Manuel R. Egana, minister of fomento, who said relations with the companies were very satisfactory and that the government considered itself a partner in these enterprises rather than a mere landlord.

Several United States companies not now in Venezuela are known to be watching the situation closely and will presumably make offers if new concessions are granted. Various companies in Europe also are understood to be interested. One of these is Petrofina, major European refining and marketing company which is reported to have recently discussed a contract with Pemex in Mexico.

Effect of British action.—Officials of the government and the Venezuelan oil companies are known to be alarmed over the likely effect of the British Government's policy of restricting dollar-oil imports and also the possibility of a sharp increase in the import duty on oil in the United States.

A substantial increase in the import duty into the United States would seriously affect Venezuela oil. The United States is Venezuela's best oil market, taking 272,000 bbl. daily of crude in November. Advocates of restricting United States oil imports believe generally the chances of action this year have been considerably improved by recent record imports.

The other development, curtailment of dollar imports into the sterling area, will react against Venezuela to an undetermined extent. Jose Martorano Battisti, Venezuela Minister of Fomento official, has been in London recently on what was described as a trip to obtain information from company and government officials in the United Kingdom.

These developments affecting the market outlets for Venezuelan oil form the background against which Venezuela is considering changes in oil policy and new concessions possibly to companies not now represented.

Over the last year there seems to have taken place an increasing realization of the high costs, considering labor, taxes, and other expenses, involved in producing oil in Venezuela. With this is a feeling that Venezuelan oil will be at a competitive disadvantage in the world export trade as compared to Middle East production. One result may be the modification or elimination of the refinery obligation attached to the last concessions awarded and requiring that the companies refine 10 per cent of their output in Venezuela.

Exploration in Ecuador

HOUSTON.—Four exploration parties are currently at work on the more than 2,000,000 acres which Manabi Exploration Co., Inc., has under lease in Ecuador.

The company, organized early in 1949, had 400,000 hectares under lease initially, but has recently acquired an additional 487,500 hectares. All of the land is located in the coastal region of the country. No drilling is planned until the next dry season which will be the middle of this year.

The four exploration parties now at work consist of a gravity party, a surface-geology party, and two soil-analysis crews. Vann Hess, with offices in Quayaquil, is in charge of the crews for Manabi. The company is carrying on the only exploration in coastal Ecuador except for some in the immediate vicinity of producing areas. The coastal region has a good Tertiary section which is predominately marine. It has a composite thickness of 50,000 ft.

Ecuador produces only about 7,500 bbl. daily of oil. Most of this is from the Santa Elena Peninsula district and is found in the upper Eocene at from 800 to 4,500 ft. The country has one of the most lenient petroleum laws of any South American country. In addition, Manabi reports that labor conditions are good and that the over-all picture is conducive to private enterprise.

The young company is incorporated under the laws of the state of Texas. Cecil V. Hagen, Houston consulting geologist and independent operator, is president and general manager of the firm. Stockholders of the company consist of independent oil men from Houston, Dallas, Tulsa, and New York.

El Roble Drilling Slowed

Pantepec Oil Co., C.A., has curtailed drilling operations in the deep El Roble field, Venezuela. Drilling for Pantepec has been done by Creole Petroleum Corp.

After current wells have been completed Pantepec will do no further drilling in the field because capital investment required there is much larger than required in other fields where such operations are more profitable.

EUROPE

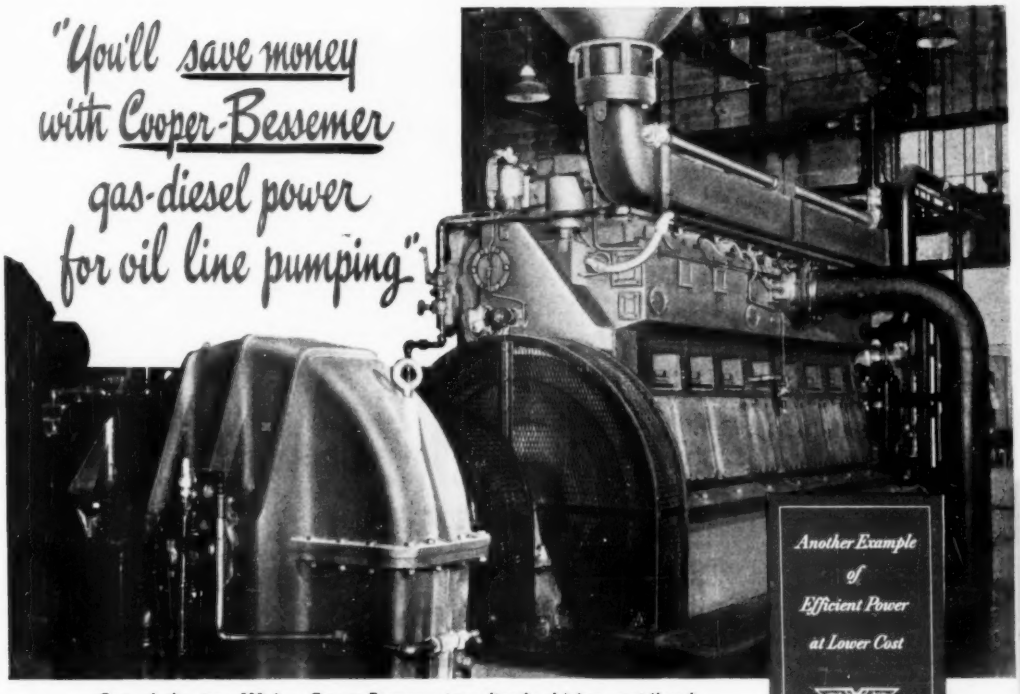
ECA Loan to Britain Cut

WASHINGTON.—Marshall plan grants for refinery construction in Britain were cut back $7,588,000 last week. There were no indications in Economic Cooperation Administration circles that the action had any connection with ECA's opposition to the inflated British refinery program.

The funds were recalled as the result of a revision of the Shell Haven refinery project. The new distillation capacity to be installed was reduced from 66,000 to 40,000 bbl. daily, and a proposed catalytic cracker was eliminated. The original project had an estimated cost of $58,400,000, including $10,043,000 of ECA funds, while the revised plan will reduce the cost to $34,000,000 and the ECA contribution to $2,455,000.

As now outlined, the project calls for the installation of a reforming

"You'll save money with Cooper-Bessemer gas-diesel power for oil line pumping"

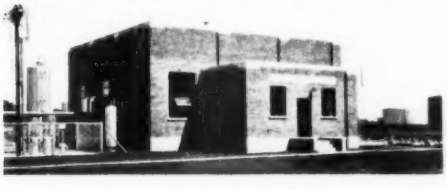


One of the two 690 hp Cooper-Bessemer gas-diesels driving centrifugal pumps in Empire Pipe Line Company's Sour Lake, Texas, station. Typical Cooper-Bessemers, these engines are giving exceptionally economical trouble-free service.

HERE'S 4-WAY PROOF OF NEW ECONOMY AND HIGH EFFICIENCY

Cooper-Bessemer gas-diesels are a money-saving "natural" for oil line pumping service. This is evidenced by the performance of two of these modern units in Empire Pipe Line Company's Sour Lake station (shown here). Originally installed as oil-burning diesels during 1946-47, the engines operated with exceptional efficiency and economy, but were later converted to gas-diesel operation.

A view of Empire Pipe Line Company's modern pumping station at Sour Lake, Texas, powered by the two Cooper-Bessemer 690 hp gas-diesels.



DIRECT SAVINGS AND ADVANTAGES

1. Here, as elsewhere, the use of low-cost gas, at full diesel efficiency, has cut fuel cost to a mere fraction of the cost of oil-burning operation. Cooper-Bessemer gas-diesels operate on any gas-oil combination from 5 to 100% oil as influenced by fixed or variable fuel supply.

2. Lube oil consumption is incomparably low. The oil-burning diesels operated a normal 2,340 hp hrs per gallon of lube oil consumed. Gas-diesel operation now actually averages 9,350 hp hrs per gallon. This big saving is also typical.

3. Likewise, the lube oil filters lasted over 3 times as long, indicating less than one-third the lube oil contamination under gas-diesel operation.

4. Overhauls after 11,000 operating hours showed only .003" liner wear at the top. There was no measurable wear at the middle of the liners. The rings showed so little wear they were reinstalled.

Why not add up the savings and advantages you stand to gain with reliable, highly efficient Cooper-Bessemer gas-diesels on the job?

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plant, a polymerization plant, and necessary treating plants in addition to the new crude-distillation unit.

The ECA grant will include $704,000 to pay for designing and engineering services and $1,176,000 for equipment such as pumps, valves and fittings, instruments, piping, large derricks, and cranes, all to be procured in the United States. As the work progresses an additional $575,000 will be authorized.

Italian Terminal Finished

Standard Italo-Americana del Petrolio, Italian affiliate of Standard Oil Co. (N. J.) has inaugurated its largest coastal terminal at Genoa. Total capacity of the new installation is 80,000 cu. m. (about 500,000 bbl.).

The Calata Canzio Quay terminal at Genoa includes two tanks of 21,000 tons (about 150,000 bbl.), among the largest in Europe. The facilities provided can unload products from 30,000-ton tankers at a rate of about 22,500 bbl. an hour.

In connection with Italian distribution activities, it has been reported that the Italian Government has decided to establish an oil-bunkering station at Taranto by placing Italian Naval storage facilities at the disposal of the government oil organization, Azienda Generale Italiana Petroli (AGIP). Foreign ships calling at Taranto for bunkering would be exempt from payment of port duties.

This development has caused considerable concern among private Italian companies who fear the government is moving in the direction of a distribution setup monopolized by the state. A state monopoly has already been projected for oil exploration and production in the Po Valley.

New Carbon-Black Plant

Yugoslavia has completed and placed in operation a new carbon-black plant which with existing facilities is expected to meet domestic needs for the product. The new Pecina plant is located near Bakar and is reported to be a more modern installation than the plant at Kutina.

Italian Exploration

A group representing Santa Fe Drilling Co., a California company, has recently arrived at Cortemaggiore in northern Italy to work under contract for Azienda Generale Italiana Petroli in development of the field.

According to a recent report from Italy, the Santa Fe party is working on AGIP's Cortemaggiore wells 1, 2, 3, and 4 with equipment capable of reaching to 13,000 ft. However, first efforts were unsuccessful in obtaining oil production, it was said. Present output is confined to distillate.

Another development in Italian oil exploration is a report that a local Italian company has begun drilling near the Adriatic Coast 50 to 60 km. northeast of Venice in an area in which little wildcatting has heretofore been carried out.

French Refining Gain

A 39 per cent increase in total annual throughput occurred in the French refining industry last year.

Figures released in Paris by the French Petrol Association showed that French refineries in 1949 processed 11,530,000 tons of crude oil against 8,326,000 tons in 1948. The 1949 total is equivalent to about 230,000 bbl. daily against 167,000 bbl. daily in 1948.

Production of major products was: motor fuel, 2,491,034 tons; gas oil, 1,802,711 tons; light fuels, 1,054,760 tons; and heavy fuels, 4,407,330 tons.

The 1949 throughput was in line with the original estimate made by France and submitted in the European Recovery Program. This called for 11,200,000 tons in fiscal 1949 with 12,715,000 tons in fiscal 1950.

The French plan calls for attaining a refining capacity of about 18,700,000 tons a year by 1952-53. Prewar France had the largest refining industry of any European country, totaling about 8,000,000 tons in 1938. If the postwar expansion program is achieved, however, the United Kingdom will build up its refining capacity to nearly 20,000,000 tons.

FAR EAST

Philippine Oil Law

Legislation compares favorably with laws of other oil-producing countries, has some undesirable aspects

Dahl M. Duff

THE Republic of the Philippines has placed in effect a new petroleum law designed to promote exploration work by Philippine and American companies.

On the whole, the provisions of the law as passed by the Philippine Congress are favorable, particularly in comparison to some of the restrictive petroleum legislation enacted in several countries in the last few years.

One unusual and undesirable feature of the law, from the standpoint of large-scale oil operations, arises out of its limitation on granting concessions to Philippine citizens or companies with a minimum of 60 per cent Philippine capital.

Limitations of the law.—United States citizens and businesses are given the same rights as Filipinos under the law as provided under an ordnance to the republic's constitution. This act, however, is effective only until 1974, and as a result, the term of exploitation oil concessions is limited to a relatively short 25 years.

Commenting on this in a talk at a meeting of the Manila section of the American Institute of Mining and Metallurgical Engineers, Demetrio Andres, director of mines in the Philippines, pointed out the concession term is coexistent with the duration of the executive agreement between the Philippines and the United States, and said: "Several companies have expressed their objection against this particular provision on the ground that a period of 25 years is too short for most companies to explore and to recoup their investments. This objection is considered reasonable and well taken and backed up by actual conditions in the world petroleum operations. However, in view of the fact that the period set up in the Executive Agreement is provided for in the Philippine Constitution, as amended, this objection can only be met directly by another amendment of the constitution."

Enactment of the new Philippine oil law followed a report by a special mission which visited the United States, Europe, and Mexico to study the petroleum situation. The group consisted of Sebastian C. Moll, chairman of the committee on mines of the House of Representatives, Pascual Bautista, chief attorney of the Bureau of Mines, and Andres. The law replaces the Petroleum Act of 1920 which was considered obsolete and inadequate to meet modern requirements of the industry.

Oil prospects.—There is now no commercial production in the Philippines, but officials of the republic are aware of the importance of providing conditions under which thorough investigation of the oil possibilities of the islands can be carried out. In 1948, the Philippines imported about 27,500 bbl. daily in products to meet its needs.

Exploration work in the Philippines since the war has been carried out by Philippine Oil Development Co. which last year drilled to 5,500 ft. and ran into operational difficulties. There are numerous oil seeps in the islands, and over the last 50 years intermittent test drilling has been undertaken.

In 1936 several wells were drilled in central Cebu and oil was found

seeping in some of them. A well in northwestern Leyte east of the Calubian anticline went to about 350 m. and yielded a small quantity of oil. Indications of oil were found in nine shallow wells drilled in Bondoc Peninsula of Quezon Province. Richmond Oil Co. drilled four holes in 1921-25, one to 5,000 ft., and Philippine Oil Development drilled five wells in 1937-38. This company's well in central Cebu, where many oil seeps are reported, was abandoned at about 8,000 ft. because of the war.

Refining and royalty.—The new Philippine law provides for a 12½ per cent royalty in kind or cash and an annual exploitation tax. A maximum of 10 years is allowed in the exploratory period, and one-half of the area of the exploration concession can be converted to the 25-year exploitation concession for commercial production.

A refinery obligation also is called for in the law, although this provision does not appear burdensome. The government is empowered to require the construction of a refinery of up to 10,000-bbl. daily capacity by a concessionaire after he has developed a production of at least 10,000 bbl. daily backed by a 140,000,000-bbl. reserve.

Five kinds of concessions are set up in the Philippine law. They are for: nonexclusive preliminary reconnaissance, exploration, exploitation, refining, and pipe-line operation. A refining or pipe-line concession is obligatory to an exploitation concessionaire, and any refinery built in the republic must give preference to the processing of Philippine oil over imported crude.

Several miscellaneous provisions in the law are designed to encourage exploration work. For the first 5 years after any concession is granted, the concessionaires may import duty free all necessary equipment and supplies. The law prohibits the levying of any export tax on petroleum produced under its terms.

The law declares exploration, production, refining, storage, and transportation of petroleum to be a public utility, and confirms the ownership by the state of all subsurface oil and gas deposits. Easements over the rights to enter private lands are provided. Concessionaires are required to give preference to Filipinos in employment insofar as they are qualified.

Under the law the government of the republic may set aside petroleum reservations in which the government itself can carry exploration and production itself or by contract. Areas turned back by concessionaires in converting exploration concessions and those covered by expired or cancelled concessions are in national reserves on which concessions are granted on the basis of the best offer to the government. In this respect, and in various others, the Philippine law followed the pattern of Venezuela's petroleum legislation of 1943.

The Philippines, though not a producing or refining country, are a major petroleum market in the Far East. This view shows the Pandacan terminal of Standard-Vacuum Oil Co. at Manila which has been completely rebuilt since the war. The installation has a total storage capacity of 605,000 bbl., several times the prewar capacity. Included are facilities for 170,000 bbl. of automotive gasoline, 80,000 bbl. of diesel oil, and 140,000 bbl. of bunker fuel storage. There are warehousing facilities for 38,000 drums of lube oil, 72,000 5-gal. cans of kerosine, and 40,000 5-gal. cans of gasoline. The plant manufactures 6,000 5-gal. cans daily. (Standard-Vacuum Oil Co. photo).

Exploration concessions. — The 2-year nonexclusive exploration permit, renewable for a second 2 years, is intended to allow a general investigation by surface geology and geophysics. It does not permit exploratory drilling.

The exploration concession itself carries exclusive rights and is granted for a possible 10-year period, 4 years initially and two 3-year extensions. Concessions are granted for rectangular blocks of from 20,000 to 100,000 hectares with a maximum per person of 500,000 hectares in any one petroleum region or 1,000,000 hectares in the entire republic. The exploration tax is set at 5 centavos (the Philippine peso is worth 50 cents U. S.) per hectare per year the first year, increasing to 12½ centavos per hectare per year the tenth year.

The concessionaire is required to submit an annual program and carry out the work with reasonable diligence. He is required to spend certain minimum amounts annually, varying from not less than 50 centavos per hectare the first year to two pesos per year the fourth year. Any excess may be carried forward, but if the amount actually spent is below the minimum, he is required to pay the government the difference between this and the requirement.

For the exploitation concession, up to one-half of the exploration block can be converted at any time. The exploitation tax is fixed at 50 centavos per hectare per year the first 5 years increasing each 5-year period to 5 pesos per year after the twentieth year. All tax over 50 centavos per hectare is credited against royalty.

Concession duration.—Drilling is required within 1 year after the concession is granted, and drilling shall continue in accordance with established oil-field practice. The concessionaire cannot suspend work for more than 6 months without government permission and in no case more than 2 years. The government can require refining of the production in the republic, provided suitable facilities are available, in the same proportion as total Philippine production bears to total Philippine domestic requirements. The exploitation concessions are renewable for a second 25-year period, a provision apparently valid only for Filipinos. If the concession expires or is cancelled in the first 25 years, the government holds an option to buy the equipment and facilities.

Test Below 12,000 Ft.

The deep test of Burmah Oil Co. (Pakistan Concessions), Ltd., at Lakhra in the Sind Desert northeast of Karachi, Pakistan, is now below 12,000 ft., according to a company announcement in Karachi.

The well is a rank wildcat designed to test thoroughly the oil prospects of the area possibly to 16,000 ft. Unoffical reports are that the well was still in the Cretaceous at about 12,300 ft. Some gas has been encountered in fissures.

Burma's Recovery Halted

British withdraw financial aid for reconstruction of oil industry; Burmese Government also fails to help

THE British Government has withdrawn its financial support for reconstruction of the oil industry in Burma, and in Rangoon, Burmah Oil Co. (Burma Concessions) Ltd., indicated it has little hope of being able to resume normal operations.

The announcement by Burmah Oil discussed present conditions in the country, pointing out the companies could do no more than produce a small quantity of crude for processing at the Chauk topping plant since normal working conditions are a "physical impossibility." In the absence of security, it said, the main pipe line from the fields to the Syriam refinery near Rangoon cannot be repaired, much less operated.

No help from Burma.—Burmah Oil recalled that the oil companies had notified the Burmese Government more than a year ago that, in view of conditions, they could not continue to invest further in rehabilitation, and that the Burmese Government then suggested it advance funds for the work, thus acquiring an interest in the industry.

"Unhappily now, after the lapse of over a year, the funds have not been forthcoming, and furthermore the industry has no discernable prospect of becoming fully rehabilitated or being enabled to operate normally by any date near enough for practical purposes," the company said.

As a result, the company said, large numbers of men for whom there is thus no work can no longer be employed. It said it would continue to employ only the comparatively few men required for the small volume of petroleum production and refining at Chauk and for those required at the ocean installation at Syriam.

The statement said that the oil companies had expended large sums and devoted their most strenuous efforts toward rehabilitation of the industry. "Much of this has been spent in wages, but a large proportion represents new and rehabilitated plant and buildings" Burmah Oil said. "The oil companies trust that at some time a brighter day will dawn and that in the meantime everything that is practicable will be done to lessen damage to those vitally important installations which are their property and also the foundation from which they could — given the requisite security conditions—raise the indigenous oil industry again to a position of filling not only Burma's internal need for petroleum products but also that share of overseas trade to which Burma's indigenous petroleum resources would normally be potential."

A communique issued in London by the British Government said that Burmah Oil and associated companies had declined in 1948 against further work in the country after spending over £8,000,000 since the end of the war. However, in deference to the wishes of the Burmese and British governments, the company agreed to continue rehabilitation with "certain assurances" given by the British Government against future losses arising out of the expenditure on rehabilitation.

British view.—"Whilst impressed with the importance of stability in Burma, His Majesty's Government have now reluctantly decided that continuation of this particular form of assistance is no longer justified, and they have therefore terminated the assurances to the Burmah Oil Co. . . ." the communique said.

These two announcements showed that there is little prospect of Burma regaining any of its prewar importance in the oil trade of the Far East and Southwest Asia. Before the properties were destroyed in the Japanese invasion, more than 21,000 bbl. daily was produced, and the refineries could handle up to about 27,000 bbl. daily.

Since the war, efforts to rebuild the industry have been increasingly hampered by the civil war between Burma and various "rebel" organizations. The situation has progressively worsened, and as Burmah Oil indicated in its statement, there is little chance of further work until stability is achieved.

The shipment of the first large-size line pipe ever made in Canada took place recently at Welland, Ont. The 16-in. pipe will be used on the Regina-Gretna, Man., section of the 1,150-mile Edmonton-Lake Superior line of Interprovincial Pipe Line Co. When completed, this project will give Alberta crude its first outlet to eastern markets. Quantity production of pipe of this dimension had never before been attempted in Canada, and Page-Hersey Tubes, Ltd., built a new mill at Welland costing about $5,000,000. Right is one of the first carloads of the pipe.

Refinery Back On Stream

The Syngei Gerong refinery of Standard-Vacuum Oil Co. near Palembang in South Sumatra went back on stream January 14 after a 5-day shutdown caused by labor disorders.

The 64,000-bbl. daily capacity refinery was closed as a precautionary safety measure after wildcat sitdown strikes had spread to the process sections. Negotiations were under way between the company and labor representatives with government assistance. The 71,000-bbl. daily refinery of the Shell organization at nearby Pladjoe was not affected by the strikes.

MIDDLE EAST

Royalty Payment in Gold

South Africa may mint gold sovereigns for Arabian American Oil Co. for the company's royalty payments to the Saudi Arabian Government, according to the South African Government Information Office in New York.

Negotiations for minting the sovereigns have been conducted with the government of the Union of South Africa, and it is reported the union is prepared to provide the gold and do the job but at a premium.

ADVERTISING PAGES PUBLISHED 1949

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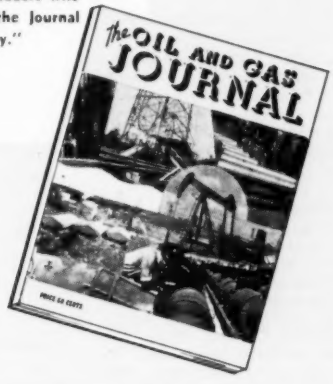

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PERSONALS

Resigns

'Billy' Connelly will do special work for Sinclair

WILLIAM L. (BILLY) CONNELLY, chairman of the board of directors of Sinclair Oil & Gas Co., has resigned as director and chairman and will devote his time to special work for the company.

A veteran of 58 years of continuous service in the oil industry, Connelly has been with Sinclair since 1906, when he took charge of the company's land and production activities in the Mid-Continent area.

A native of Cleveland, Connelly attended St. Patrick's school and St. Ignatius College at Cleveland.

In 1903 Connelly opened the Bolton oil pool in Montgomery County, Kansas. Joining Sinclair in 1906, he moved to Tulsa in 1912 to become an officer of the original Sinclair Oil & Gas Co. He was named vice president of Sinclair Cudahy Pipe Line Co. in 1915. In 1916 he assisted in merging a group of companies into what is now known as Sinclair Oil Corp., and a year later he became president of Freeport Mexican Oil Co. and vice president of Sinclair Mexican Oil Corp., headquartered in Houston.

Moving to Casper, Wyo., in 1922, Connelly was in that area until 1926, when he was transferred to New York in charge of foreign operations and became president of Venezuelan Petroleum Co. In 1932, when Sinclair and Prairie Oil & Gas Co. were merged, he returned to Tulsa as chairman of the board of Sinclair Prairie Oil Co.

He is a member of the Order of the Holy Sepulcher, and was made a Knight in that order by Pope Pius XI in October 1933.

Richard L. Fedell, assistant district engineer for Phillips Petroleum Co. at Rangely, Colo., has been transferred in a similar capacity to Odessa, Tex.

Robert E. Norris, station engineer at Circleville, Ohio, for Texas Eastern Transmission Corp., has been transferred to the company's Summerfield, Ohio, station as chief operator.

L. V. Bass, formerly head roustabout at Pawhuska, Okla., for The Texas Co., is now serving as production foreman in the Bird Creek, Okla., district.

Lon D. Cartwright, Jr., chief geologist, Gulf division, Union Oil Co. of California, has taken up new duties in Los Angeles as chief geologist for the company.

Dr. G. H. Duerksen, formerly research chemist for Phillips Petroleum Co., Bartlesville, Okla., is now serving as professor of chemistry at Tabor College, Hillsboro, Kans.

Gene D. Thompson, associate petroleum engineer for Humble Oil & Refining Co. at Houston, has been named assistant district engineer of the Maurbro, Tex., production district.

Ed Gallagher, formerly division engineer of the Rocky Mountain area for Shell Oil Co., with headquarters at Casper, Wyo., has been transferred to Los Angeles as senior mechanical engineer.

M. W. Norris, drilling-tool foreman at Jal, N. M., for Magnolia Petroleum Co., has been transferred in a similar capacity to the Ozona, Tex., area.

L. O. Crockett, formerly assistant general superintendent of Gulf Oil Corp.'s Texas refineries, directing technical activities, has transferred from Port Arthur, Tex., to Pittsburgh as manager of the technical division of the company's manufacturing department.

James F. Hartman has been named superintendent of the McPherson, Kans., refinery of Bay Petroleum Corp., replacing **Amos G. Pollard** who has been transferred to Chalmette Petroleum Corp. at Chalmette, La., as superintendent. Hartman formerly was with Frontier Oil Refining Co. at Buffalo, N. Y., and prior to that was process and development engineer for Sun Oil Co. and National Refining Co.

G. W. Good, Kerr-Megee Oil Industries, Inc., has been transferred from the West Texas division to Xieaiango, Mexico, where he will serve as drilling superintendent.

Joe Swartz, geologist for Sun Oil Co. at Evansville, Ind., has been transferred to Billings, Mont., as district geologist.

R. J. Lindquist, Chicago, vice president and director of Standard Oil Co. (Ind.), has been elected to the board of directors of American Security & Trust Co., Washington, D. C.

H. B. Hurley, assistant regional general manager for Continental Oil Co. at Fort Worth, has resigned to become vice president of Republic Natural Gas Co., Dallas. Hurley has spent more than 30 years in the oil industry, and has been with Continental for 23 years. He joined that firm's production department at Ponca City, Okla., in 1926, and has been in charge of Continental's producing operations in the Fort Worth area since 1938. In 1948 he was named assistant regional general manager.

R. W. McCanne, division geologist for Ohio Oil Co., Casper, Wyo., has been named assistant to the general manager of production at Findlay, Ohio.

Dean A. I. Levorsen, geologist and formerly president of the Geological Society of America, has resigned as dean of the Stanford School of Mineral Sciences, Stanford, Calif., in order to be freed of administrative work so that he can devote his time to teaching, and research in petroleum geology. He has been succeeded by **Dr. Charles F. Park, Jr.,** who has been on the staff since 1946.

J. M. Duncan, tool pusher for Noble Drilling Corp. at Roundup, Mont., has been transferred to the Sussex field at Edgerton, Wyo., in the same capacity.

Dr. W. Armstrong Price, Corpus Christi consulting geologist, has been elected professor of geological oceanography in the new department of oceanography in Texas A. & M. College's Graduate School at Bryan.

J. M. Penrod, formerly district superintendent at Joe's Lake, Tex., for American Republics Corp., has been

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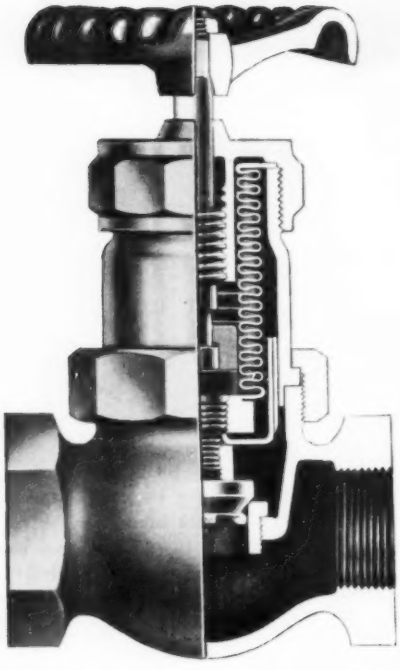

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transferred to the company's Houston office as reservoir engineer. **N. F. Gulledge** will replace Penrod at Joe's Lake as district superintendent. He was formerly located at Bancroft, La.

W. N. STIVERS

W. N. Stivers, Casper, Wyo., engineer for Stanolind Pipe Line Co., has been named superintendent of the Wyoming Salt Creek district, and will be in charge of extensive gathering lines in that area, under **R. R. Strand,** area superintendent. **S. L. Cox** will serve as area engineer for both the Nebraska and Wyoming divisions, with headquarters at Casper. **Hobart G. Mariner,** engineer, has been appointed superintendent of the Missouri division, succeeding **E. W. Young,** who retired recently. Stivers has been with Stanolind Pipe Line since 1935. Cox joined the company in 1933 at Tulsa, and Mariner has been with the firm since 1940.

A. E. Gettzendaner, zone geologist, Gulf Oil Corp., has been transferred from Houston to the company's Corpus Christi office.

C. P. Bristol, chief exploitation engineer for the Houston area, Shell Oil Co., has been named area production manager. A graduate petroleum engineer from the University of Oklahoma, Bristol is a veteran of nearly 19 years with Shell, beginning work for the company in the East Texas oil fields in 1941. From 1944 through 1947 he served as division production manager at Kilgore, and in 1948 was named area chief exploitation engineer at Houston. **G. E. Burpee,** who formerly held the post of area production manager, has been transferred to Calgary, Alta., where he will be in charge of Shell's production activities in western Canada.

C. P. BRISTOL

Richard Bard, formerly manager of Shell Oil Co.'s gas-gasoline department, Tulsa, has been named assistant manager of the crude-oil department in charge of volatiles, New York City. He has been replaced in Tulsa by **Ruel Harris,** a member of the crude-oil department in New York.

H. R. Smith, San Antonio independent operator, has moved his San Antonio office to Alice, Tex., and consolidated with his office in that city.

George Echols, Dallas, has been assigned to the Tyler, Tex., office of Standard Oil Co. of Texas, as geological scout, replacing **H. L. Gist, Jr.,** who has been transferred to Dallas.

J. M. Vetter, recently elected vice president of Pan American Production Co., has been named to the boards of directors of Pan American Production Co. and Pan American Gas Co. He will also serve as a member of the executive committee of both companies.

Floyd K. Krebill, petroleum engineer for Stanolind Oil & Gas Co. at Elk Basin, Wyo., has been transferred in a similar capacity to Rangely, Colo. Other transfers include: **Elbert L. McKinney,** mechanical engineer, from Hastings, Tex., to Lake Charles, La.; **Harvey L. Howard,** mud engineer, from Casper, Wyo., to the Canadian division; **Walter B. Munn,** mechanical engineer, from the Tulsa general office to South Fullerton gasoline plant, Andrews, Tex.; and **George W. Tracy,** petroleum engineer, from Midland, Tex., to the Tulsa research laboratory.

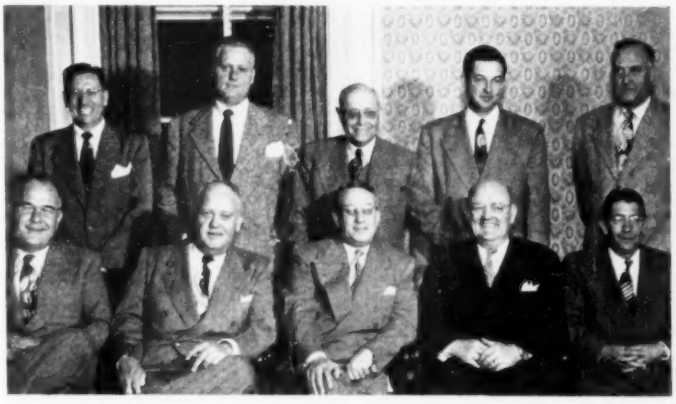
J. M. Wadsworth, who recently retired as head of the chemical-processing division of Lion Oil Co., is now in Cairo, Egypt, where he is in charge of a new chemical plant being built by the Egyptian Government. Wadsworth was connected with Mid-Continent refinery operations for many years and at one time was associated with Foster Wheeler Corp.

W. R. LUND

H. V. STEADMAN

W. R. Lund, Tulsa, Oklahoma division production manager for Shell Oil Co., has been transferred to the regional production staff, where he will pursue an advanced training program. Succeeding Lund is **H. V. Steadman,** Kansas division manager. **J. W. Sutton,** Houston, replaces Steadman in Kansas. Lund joined the company in 1934, and has served in various capacities. Steadman joined the company in 1927 at Oxford, Kans., and has served as area chief mechanical engineer and division manager. Sutton joined the company in 1937.

C. W. Tomlinson, Ardmore, Okla., independent operator and president of the American Association of Petroleum Geologists, was guest of honor at a luncheon recently given by the Colombian Petroleum Insti-



New officers of the Los Angeles chapter of Nomads. Seated, left to right, are Fred Ripley, International Derrick & Equipment Co., board of regents; Herm Pachall, H. C. Smith Oil Tool Co., assistant secretary; Earle Boggess, Baker Oil Tools, Inc., president; Ted Forsyth, Emsco Derrick & Equipment Co., vice president; Knight Templeton, Champion & Smith, Inc., treasurer. Standing are Lee Laird, Gil-Lair Products, Inc., board of regents; James Hughes, Lane-Wells Co., deputy sergeant-at-arms; Jack Ballagh, Extruders, Inc., secretary; John Flanagan, M. O. Johnston Oil Field Service Corp., assistant treasurer; and Jerry Engstrand, Grant Oil Tool Co., sergeant-at-arms.

PERSONALS

tute in Bogota. Tomlinson spoke on "Lost Reserves," a subject which he discussed recently at a meeting of the A.A.P.G. section in New York.

Norval Franklin Myers has been elected a member of the board of directors of Anglo-American Oil Co., Ltd. [Standard Oil Co. (N. J.)], and will be concerned mainly with the company's refining activities in the United Kingdom. Myers joined Standard Oil Development Co. in 1941 as assistant chief engineer after 16 years' experience in the petroleum industry as a research chemical engineer and in various manufacturing management capacities. Anglo-American also has announced that **H. D. Demoulins,** a director since 1947, will remain in New York to handle matters relating to the expansion of the company's refinery at Fawley, England.

J. Strother Miller, formerly technical director of Barber Asphalt Co., and **Warren B. Warden,** consulting engineer, have formed the firm of Miller-Warden Associates, and will engage in consulting work, with headquarters in Swarthmore, Pa.

H. F. Goss, Humble Oil & Refining Co., has been assigned to the new position of operating superintendent of the process and oil-movements divisions, Baytown, Tex., refinery. Other changes at the refinery include: **Karl Opryshek,** named process superintendent replacing Goss; **J. S. Palmer,** named general foreman of cracking and polymerization; and **G. S. Bays,** named assistant process superintendent. **F. C. Fowler** will continue as assistant process superintendent. **E. W. Hunt** has been named assistant general foreman of cracking and polymerization, replacing **A. J. Babin,** who has resumed the position of foreman of cracking and polymerization; **T. E. Peterson** has been assigned to the mechanical division as assistant zone supervisor; **F. J. Spuhler** has been assigned as coordinator-general, replacing **B. E. Wilson,** who has been named assistant superintendent of oil movements; **A. J. Thaman** has been named assistant employe-relations manager; **J. N. Chatfield** has been assigned to general foreman of light ends; and **P. G. Cater** will continue as assistant general foreman of light ends. **Ray Robertson** is now assistant general foreman of distillation; **J. H. McCulley,** senior chemical engineer, technical-service division, assistant general foreman of distillation; and **J. R. Barsalou, Jr.,** section head, technical-service division, is now general foreman of light oil and extraction, replacing **F. L. Fourrier,** currently on special leave. **E. M. Watkins** will continue as assistant general foreman of lube-extraction plants and **M. H. Emanuel** will continue as foreman of the dehydrogenation unit. **J. S. Keating,** assistant zone supervisor, has been named night superintendent; and **H. C. Moran,** zone safety supervisor, has been given additional assignment of assistant dockmaster.

T. D. Harris, formerly manager of Continental Oil Co.'s motor-transportation division, Ponca City, Okla., has been named senior consultant of the administrative department. He has been with the firm more than 22 years.

V. E. Sicks has been appointed chief engineer of the Lake Charles, La., refinery of Cities Service Refining Corp., and **Gordon B. Wooster,** formerly assistant butadiene superintendent, has been appointed superintendent of that plant succeeding Sicks.

SHIFTS

James B. Crawford, chemist, The Texas Co., Alhambra to Long Beach, Calif.; **D. R. Brinton,** Continental Pipe Line Co., Texon to Wichita Falls, Tex.; **L. P. Brown,** engineer, Continental Oil Co., Big Spring to Borger, Tex.; **Robert A. Dean,** engineer, Standard Oil Co. of Texas, Midland to Abilene, Tex.; **L. R. Dane,** superintendent, Pure Oil Co., Tulsa to Clay City, Ill.; **H. D. Miller,** engineer, Amerada Petroleum Corp., Fairbanks to Longview, Tex.; **B. J. Brown,** engineer, Mid-Continent Petroleum Corp., Seminole to Midland, Tex.; **J. L. Hicks,** superintendent, Houston Oil Co. of Texas, Kilgore to Longview, Tex.; **Howard E. Fish,** superintendent, Sunray Oil Corp., Premont to Yorktown, Tex.; **Edward C. Micak,** engineer, Standard Oil Co. of Texas, Snyder to Iraan, Tex.; **C. A. Langner,** engineer, Humble Oil & Refining Co., New Iberia, La., to Brookhaven, Miss.

F. L. Lively, superintendent, Humble Oil & Refining Co., New Iberia, La., to Brookhaven, Miss.; **W. W. Henigman,** engineer, Kansas to Paris, Ill.; **J. H. Loeb,** engineer, Shell Oil Co., Antialia, Ill., to Denver City, Tex.; **J. B. Kennedy,** geologist, Texas Pacific Coal & Oil Co., Jackson, Miss., to Hammond, La.; **Gordon W. Hargis,** engineer, Kansas City, Mo., to New York City; **Robert L. Fleming,** engineer, Tide Water Associated Oil Co., Bristow to Drumright, Okla.; **R. M. Wemple,** engineer, Pan American Production Co., Galena Park to Texas City, Tex.; **Paul Louis Terrasson,** geologist, Shell Oil Co., Corpus Christi to Houston; **John A. Smith,** engineer, Sun Oil Co., Lafayette to Opelousas, La.

DEATHS

Hyym Elias Buc, 69, organic chemist who was with Standard Oil Development Co., 24 years prior to his retirement in 1943, died January 21 in Roselle, N. J. At the time of his death, Buc held 130 patents in the petroleum field, ranging from methods of lengthening the life of motor oil and deodorizing industrial alcohol to a mosquito repellent that was widely used by the armed forces in the war.

Lee A. Ginzel, 66, secretary and advertising director of Baker Manufacturing Co., Springfield, Ill., died January 17.

G. A. Smith, 76, retired accountant for The Texas Co., died January 20 at Houston.

Walter E. Barnhill, Jr., 28, foreman for the El Paso Natural Gas Co., died January 14 at Casa Grande, Ariz.

A. B. Harper, Fort Smith, Ark., president of Arkansas-Oklahoma Natural Gas Co., and a member of the board of directors and past president of Independent Natural Gas Association of America, died in New York City January 25. He had been a member of I.N.G.A.A.'s board of directors since the association's organization, and served as president last year.

Bart Cecil (Bob) Lucas, 59, independent oil operator in San Antonio, Dallas, and Houston for more than 30 years, died January 23 at Houston.

J. D. Walker, 66, retired employe of The Texas Co., Houston, died January 25. Walker had been employed by the firm for 39 years.

Jesse D. Lake, superintendent at Tide Water Associated Oil Co.'s Bayonne, N. J., refinery, died January 27.

GATX GEOGRAPHY

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Scurry County's NEW REEF FIELDS

LARGEST ADDITION TO NATION'S RESERVES SINCE East Texas

by D. H. Stormont
District Editor

WITH oil production fairly well established along a Canyon Reef mass for more than 20 miles in length and about 6 miles in width at the broadest point, there appears little question that Scurry County's new reef fields constitute the largest single addition to our reserves since the discovery of East Texas field.

The reef's productive limits may extend even further to the northeast and southwest; on the other hand some acreage now classed as semi-proven may turn out to be nonproductive. Likewise, continued drilling may prove that the average net productive thickness is considerably less than now estimated; or the contrary may be shown. Furthermore, average recovery per acre-foot may be larger or smaller than is now anticipated. Thus the new reserve may prove to be either much larger or smaller, but many reservoir engineers are thinking in terms of about 1 billion barrels.

These present tentative reserve estimates are based on the thought that some 50,000 acres will prove oil productive. The average pay thickness over the entire area is estimated at about 200 ft., of which about 50 per cent is thought to be saturated. Average recovery per net acre-foot of pay is being placed in the vicinity of 200 bbl. Thus average recovery per acre is being placed at 20,000 bbl., or for the field as a whole a yield of 1,000,000,000 bbl.

Performance of individual tracts is, of course, expected to vary widely from this average estimated production. In some North Snyder leases, where as much as 80 per cent of a 600-ft. producing section has been proved saturated, recoveries of more than 225 bbl. per net acre-foot are anticipated by straight pressure depletion.

The situation at the first of the year is this: At no point along the 20-mile stretch of Canyon Reef is there more than 2 miles between these 6,700 to 7,000 ft. oil producers. At the northern end, North Snyder field has been definitely linked with what was once called its southern extension area. In the 5-mile stretch which once separated this field from the Kelley area to the southwest, the Wilkerson area is undergoing development with the most widely spaced producers less than 1 mile apart.

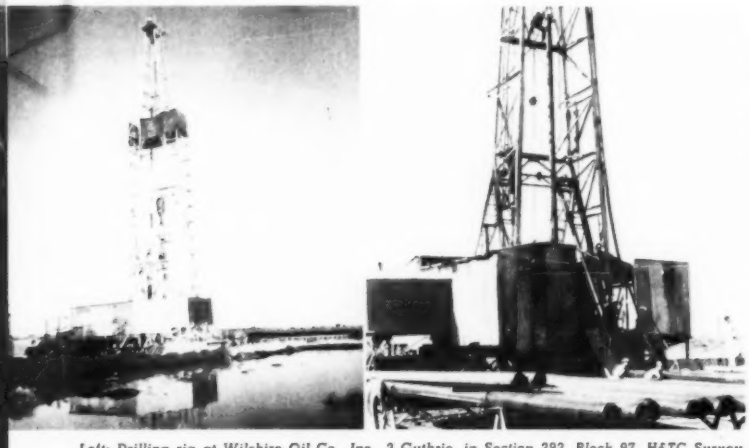
Productive limits of Kelley have been extended west, east, and north so that only 2 miles separate its producers from wells in the Wilkerson area. Less than 2 miles is between these Kelley producers and those in Diamond-M on further southwest. Finally, at the southwestern end of the reef, expansion of both Diamond-M and Sharon Ridge fields has resulted

PRODUCTION AND RIG RECORDS AT SCURRY

Initial production.—Wilshire Oil Co. 2 Reinhart, SW NW, Section 251, Block 97, H&TC Survey, was recently completed for natural flow of 205 bbl. per hour, for 2 hours, through $^{3}/_{4}$-in. choke; pay section, Canyon Reef lime 6,540-6,780 ft. Gas volume, 2,600 M.c.f. daily. This is believed to be the largest hourly flow so far reported in the Scurry area.

Rig moved.—The large unitized rotary rig from the above well also had a rapid move to the No. 3 well location, $^{1}/_{4}$ mile west. The rig has a jackknife type mast and the unit was moved without lowering the mast.

Tearing down rig equipment on No. 2 Reinhart started at 8 a.m. At 4 p.m. the same day the rig was on the 3 Reinhart location and rerigging started. The new hole was spudded at 12 midnight the same day.



Left: Drilling rig at Wilshire Oil Co., Inc., 2 Guthrie, in Section 292, Block 97, H&TC Survey. Right: Running casing at Barnsdall Oil Co.'s 1 Guy Stoker in Block 40, Tract 23, Kirkland & Fields Survey.

SCURRY COUNTY MAP.—Outside edge of colored area approximately delineates the 4,500 ft. subsurface top of the Canyon Reef. This is, in general, the presently indicated productive limits. Base map manufactured by Southwest Mapping Co., Fort Worth National Bank Building, Fort Worth, used here by special permission. Inset: District Editor Dave Stormont (right), with Kenneth B. Barnes, Journal engineering editor, looking on, locates on map Standard of Texas' discovery well in North Snyder field, Scurry County.

H&GN RR CO

HOUSTON & TEXAS CENTRAL RR CO.

BLOCK 97

BLOCK

AND

H & T C RR CO

BLOCK 25

H & G N R

BLOCK

in the intervening distance being reduced to about 1¾ miles.

In the semiproved stretches between productive areas the reef may suddenly drop below water level so that production will not be continuous—but this is not anticipated. Likewise, because best porosity and the highest percentage of net producing section is found in wells situated on top the reef mass, it is believed that none of these connecting wells will be nonproductive because of the section becoming too tight. This has proved to be the case in a few wells along the flanks, and is expected to happen in many others, but such is not anticipated along the reef backbone.

Average Reef Thickness

Based on present development, the greatest reef thickness is found in wells on the northern part of North Snyder field. As is shown in Table 1, which is an analysis of the 325 producers completed in the reef by about January 6, the 91 producers in that area topped the reef at an average subsea depth of minus 4,083 ft. Wells in the southern portion of North Snyder found the reef only slightly lower, 32 ft. on an average.

As the reef is traversed on farther southwest, successively less reef buildup is shown in general (see table). The average subsea depth of the 44 Kelley producers, minus 4,307 ft., is greatly influenced by several wells completed on the relatively flat, broad bench to the southeast of the main reef backbone. If these 10 wells are not considered, the average subsea depth of the reef top in Kelley producers is about minus 4,274 ft. In Diamond-M the average reef top of 63 producers was minus 4,287 ft., while in Sharon Ridge the average for its 26 producers was still lower, minus 4,335 ft.

A FEW PUMPING WELLS.—So far there are fewer than a half dozen pumping wells in the Scurry County fields. This is on Magnolia Petroleum Co. 1 Ada Martin in Section 190, Block 97, H&TC Survey, Kelley area.

TABLE 1—ESTIMATED THICKNESS OF REEF IN VARIOUS AREAS

Area—	No. producers (1-6-50)	Avg. subsea depth to top of reef, ft.	Est. reef thickness above water level, ft.
North Snyder, north part	91	4,083	417
North Snyder, south part	85	4,115	385
Wilkerson	16	4,244	256
Kelley	44	4,307	143
Diamond-M	63	4,287	213
Sharon Ridge	26	4,335	100
Average	325	4,189	300

Average Reef Thickness

Four producers in the North Snyder area topped the reef at datum depths only slightly less than minus 3,800 ft. Surrounding producers, however, indicate that these wells encountered peaks or pinnacles on the reef mass as all were some 100 to 500 ft. above surrounding wells. The most outstanding example of the reef's rugged topography is shown by Castleman and O'Neill 1 Huckabee in the southern portion of the field. It found the reef top at minus 3,741 ft. but three offsetting wells encountered the top at about minus 4,250 ft. The highest offsetting well topped the reef at about minus 3,850 ft., or still some 100 ft. lower.

Estimation of the thickness of the oil-producing section, or the amount that lies above the water level, is made difficult by the erratic nature of the water table. Relatively few wells have been carried to the oil-water contact, but these have indicated the level is not the same through the reef. In the North Snyder area the water level is fairly well established at about minus 4,505 ft., in Kelley it is placed at 4,450 ft., and in Diamond-M at about minus 4,500 ft. In Sharon Ridge the level is believed to be around minus 4,335 ft.

In this connection Lion Oil Co., which had assumed the water level at Diamond-M to be about the same as in Sharon Ridge (—4,335 ft.),

Reservoir Data (Bottom-Hole Sample)—Scurry County

VOLUMETRIC DATA OF RESERVOIR FLUID SAMPLE, DIAMOND M FIELD

Saturation pressure (bubble-point pressure) 1,946 psi. at 130° F.

Thermal expansion of saturated oil at 3,500 psi. $= \frac{\text{V at 130° F.}}{\text{V at 75° F.}} = 1.03869$

Compressibility of saturated oil at reservoir temperature: Vol. Vol. psi.:

From 3,500 psi. to 2,900 psi. = $14.33 \cdot 10^{-6}$
From 2,900 psi. to 2,400 psi. = $16.40 \cdot 10^{-6}$
From 2,400 psi. to 1,946 psi. = $18.06 \cdot 10^{-6}$

Specific volume at saturation pressure: cu. ft. per lb. 0.02467 at 130° F.

SEPARATOR TESTS OF RESERVOIR FLUID SAMPLE, DIAMOND M FIELD

(To determine effect of separator operating pressure upon gas-oil ratio, stock-tank oil gravity, and shrinkage factor)

Separator pressure (psig.)	Separator temperature (°F.)	Separator gas-oil ratio*	Stock-tank gas-oil ratio*	Stock-tank A.P.I. grav. at 60° F.	Shrinkage factor, V_R/V_{SAT} †	Formation volume factor, V_{SAT}/V_R ‡	Specific gravity of flashed gas
0	74	1,168	0	41.6	0.591	1.691	1.111
20	73	1,019	20	43.4	0.625	1.599	
40	72	914	42	44.7	0.646	1.549	
80	71.5	842	86	45.4	0.657	1.521	

*Separator and stock-tank gas-oil ratio in cubic feet of gas at 60° F. and 14.7 psia. per barrel of stock-tank oil at 60° F. †Shrinkage factor: V_R/V_{SAT} is barrels of stock-tank oil at 60° F. per barrel of saturated oil at 1,946 psig. and 130° F. ‡Formation volume factor: V_{SAT}/V_R is barrels of saturated oil at 1,946 psig. and 130° F. per barrel of stock-tank oil at 60° F.

HYDROCARBON ANALYSIS OF RESERVOIR FLUID SAMPLE, DIAMOND M FIELD
(Low-temperature fractional distillation)

Component—	Weight (per cent)	Mol (per cent)	Density at 60° F. (g. per cc.)	°A.P.I. at 60° F.	Molecular weight
Methane	6.53	32.73			
Ethane	4.22	11.28			
Propane	6.97	12.71			
Isobutane	1.43	1.98			
n-Butane	4.13	5.71			
Isopentane	1.97	2.19			
n-Pentane	2.20	2.45			
Hexanes	2.05	1.91			
Heavier	70.50	29.04	0.8385	37.1	195
	100.00	100.00			

recently carried its 23 McLaughlin through the reef to confirm this assumption. First traces of water were not encountered until a subsea depth of 4,501 ft. was reached, or some 67 ft. below where the water level was anticipated. Hole was carried deeper, with the percentage of salt water gradually increasing, until total salt water was encountered at minus 4,575 ft.

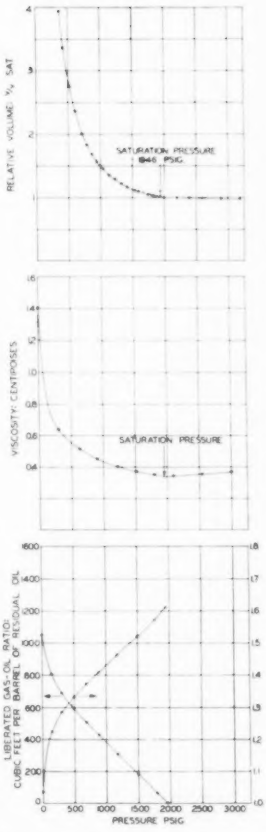
More recently Lion carried a southwestern edge well (35 McLaughlin in Section 182) to water in order to obtain a second check on the field's water level. Carried to a depth of 6,891 ft. (4,519 ft. subsea), a drill-stem test at 6,872-91 ft. recovered oil and some salt water. At last reports hole had been cored to a total depth of 6,911 ft. and a second test was to be run at 6,891-6,911 ft.

Using these general water levels as the bottom of the reef's oil-productive section indicates that the 325 producers have an average reef thickness of 300 ft. above the water level. As shown in Table 1, the thickest section is in North Snyder, 385 to 417 ft. Sharon Ridge producers, with an average of 100 ft., showed the least amount of reef above water. In the producers that topped the reef at its higher point, therefore, a maximum of 600 to 750 ft. of reef pay is shown. On the low side are the several producers, and many more to be drilled, which have a relatively few feet of pay.

Plotting these water levels as the limits for productive acreage indicates that some 50,000 acres may be considered proven or semiproven at this time. Several edge wells which encountered the reef well above the general water level, however, failed as oil producers because the pay was too tight. Thus, because of this condition, plus the erratic water level and the variable nature of the reef mass itself, only actual drilling will show conclusively the field's total productive acreage.

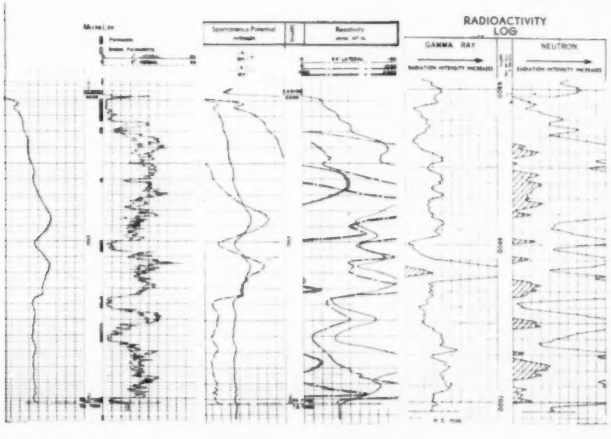
An outstanding recent example of the pay's variable nature, in wells off the reef backbone, is Sun Oil Co. 2 Lemons in SW Section 205. This well

(Continued on page 69)

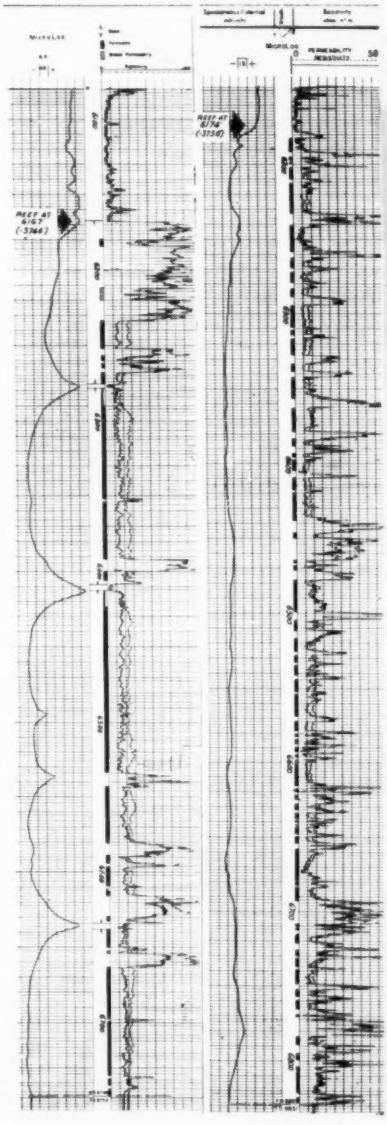

RELATIVE VOLUME Vt/ SAT
SATURATION PRESSURE 846 PSIG
VISCOSITY: CENTIPOISES
SATURATION PRESSURE
LIBERATED GAS-OIL RATIO: CUBIC FEET PER BARREL OF RESIDUAL OIL
PRESSURE PSIG
0 500 1000 1500 2000 2500 3000

***ABOVE: RESERVOIR OIL CHARACTERISTICS.**—Volume-pressure relations (top), viscosity-pressure (center), gas-oil ratio by differential gas liberation (bottom); all data at 130° F. Sample from Lion 2 McLaughlin, SE SE, Section 197, Block 97, H&TC Survey.*

***BELOW: SIDE-BY-SIDE COMPARISON.**—Interesting correlation between microlog and radioactivity log. The well is Lion Oil Co. 23 McLaughlin, NE SE Section 201, Block 97, H&TC Survey (Diamond M area).*



***BELOW: TWO "HIGHEST" WELLS IN SCURRY COUNTY, MICROLOGS.**—Left: Tide Water Associated Oil Co. 4 R. C. House, SE SE, Section 384, Block 97, H&TC Survey. Right: Castleman & O'Neil 1 Huckabee, NW NE, Section 160, Block 3, H&GN Survey. Note immense pay thicknesses.*



Super-Inch

Northern leg of P. G. & E. 34-in. line nearly completed

by Robert Harwick
District Editor

THE field camp of the Bechtel-Price-Conyes pipe-line construction group is now established near Topock, Ariz., close to the California-Arizona border. This completes a jump of 500 miles from the former site at Coyote, just south of San Jose. Right-of-way clearing is already under way in the Topock area.

This move just about marks the completion of the northern leg of the 506-mile California section of the Pacific Gas & Electric Co. 34-in. dry-gas line. With completion of this leg some 80 miles of line will be in place.

Initial plans for this section call for it to be used for gas storage. However, should the additional gas be needed in the northern and central parts of California during this winter, this section of line can be used to help transmit gas from the Kettleman Hills area of the San Joaquin Valley.

A line already exists between the Kettleman compressor station and Milpitas where the P.G.&E. meter and distribution station for the San Francisco Bay area is located. This line is 20 to 24-in. in diameter—20 in. at the northern end. It is tapped at Hollister by a 12-in. line serving the Monterey area. The new super-inch line is connected with the old Kettleman line at Llanada.

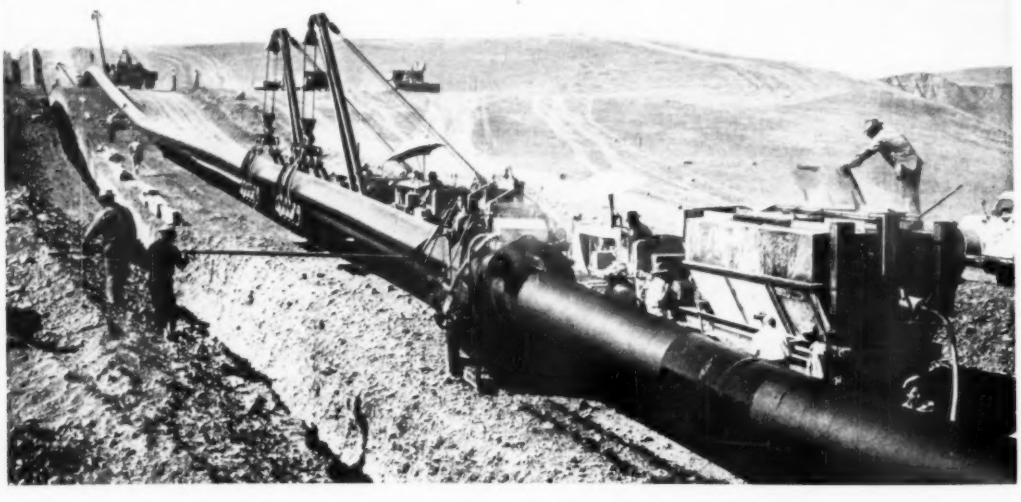
By means of these connections, and the new compressor station now being built at Hollister, present transmission capacity of the lines will be increased by 60,000,000 cu. ft. This should ease present problems pending completion of the super-inch line.

Construction began on the super-inch line late in June of this year. Ground was broken in the Panoche Hills about 30 miles south of Hollister, near the town of Llanada. Work was begun on the northern end of the line both for considerations of extra facilities for possible winter need and to take advantage of dry summer weather.

Topock marks the beginning of the super inch and of the California section of the system. At this point the California section will join two lines being laid by El Paso Natural Gas Co. One line brings gas from the Permian basin in Texas and New Mexico and the other brings gas from the San Juan basin of northern New Mexico.

Bob Harwick (right), West Coast district editor for The Oil and Gas Journal, talks "super inch" construction details with R. L. Bowman, veteran pipe-line superintendent for the Bechtel-Price-Conyes pipe line job in California.

APPLYING PIPE WRAPPING.—The two side-boom Caterpillars lift the pipe free from the ground, allowing the self-propelled machine to perform the operation. Hot tar is supplied from the self-heated trailer at a temperature of about 300° F.



The California section is being built under joint contract by Bechtel Corp., H. C. Price Co. of Oklahoma, and R. A. Conyes Construction Co. of California. Bechtel Vice President V. G. Hindmarsh is in charge of the operation with R. L. Bowman as superintendent and Stephen D. Bechtel, Jr., as job engineer.

This section will follow a general line through Needles, Mojave, Bakersfield, then up the San Joaquin Valley to meet the present leg at Llanada. Included in the project is the construction of two compressor stations and about 40 miles of smaller lateral lines. The stations will be at Kettleman, 9,600 hp., and at Topock, 7,200 hp. Line pressure at the compressor stations will be 730 psi. for first deliveries. The planned pressure at full load is 800 psi. Gas will be delivered at Milpitas at 260 psi.

Where the line crosses the Colorado River an overhead span will be used. At the Kern and Mojave river crossings the line will be submerged.

Total cost of the full line will be about $150,000,000. The 506-mile California section will cost slightly more than $63,000,000 and will use about 200,000 tons of pipe.

Initial scheduled delivery rate is set at 150 million cubic feet per day on completion in January 1951. This will be upped to 250 million on January 1, 1952 with later increases possible up to 400 million cubic feet per day total.

Work so far has not been very difficult from a heavy-construction standpoint. The most difficult problem is the present area of the Santa Clara Valley. Here irrigated orchards and other intensively cultivated acreage make the going touchy. To avoid these areas most of the right-of-way has been set at the base of the hills on the north side of the valley.

The heavily populated section from San Jose to Milpitas with its network of state and county roads marks the last few miles of the northern leg. Right-of-way is already cleared and the pipe lineup completed. This leaves the main remaining problem one of running double lines under the roads and returning property to its original appearance.

The gas-transmission line crosses an electric-transmission line, offering a contrast in modern heat and power transmission.

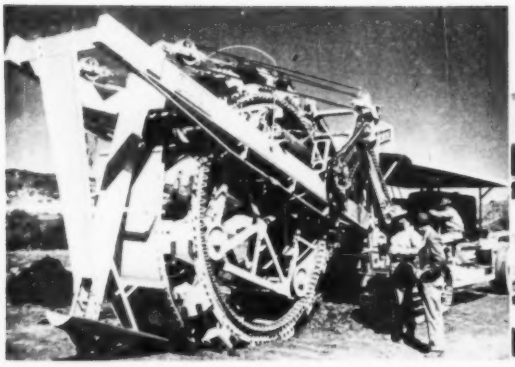
Putting a wrinkle in the pipe. The pipe-bending machine is used for cold bending the 34-in.-diameter pipe. A machine bend of 1½° per wrinkle is allowed. The support mounted on the machine provides an accurate check of the individual and total bends.

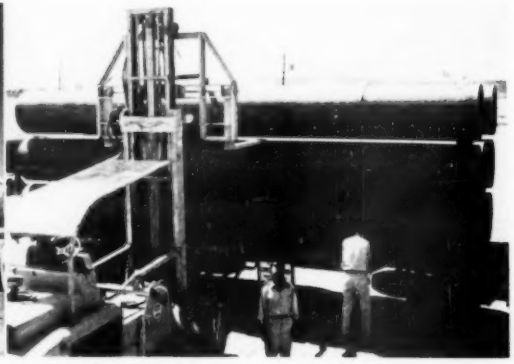
Left: A Lorain trench hoe clears loose rock from the job site and cleans the trench. Bechtel Corp. has 11 of these now on present job assignments throughout the nation. Right: A tee is added to the valve at the Hollister booster station. The 34-in. main valve at the left is one of the largest used in natural-gas installations.

The smoothness of the operation, even though the 34-in. o.d. pipe makes this the largest-diameter high-pressure gas line ever laid, is to a very great degree a measure of the planning and careful adaptation of tools for the job.

While all the equipment is from standard lines several pieces have been specially adapted for this job. Chief among these is the biggest trencher of the Buckeye line and incidentally the world's largest. It weighs 32½ tons, is 50 ft. long, and 10½ ft. wide. It cuts a ditch 5½ ft. deep and 44 in. wide.

A small, narrow-width tractor





Left: Pipe liners call this machine "Big Buck." The Buckeye trencher is 51 ft. long and weighs 32½ tons, produces a trench 5½ ft. deep and 44 in. wide at the rate of more than a mile per day. It is the largest wheel-type trencher now used in pipe-line work. Right: A novel application of the industrial lift truck. The 30-ft. sections as shown on the picture are being unloaded at the Bechtel "double ending" plant. The same truck is able to handle reloading of 60-ft. and 90-ft. lengths onto trucks to be delivered to the job site.

equipped with a 44-in. "dozer" blade is used to clean the ditch of rocks and other material that may slough off from the sides of the ditch. The tractor is run along the bottom of the ditch where and when needed. A wire-mesh cage is roofed over the driver's seat to protect from stones and clods that might fall as the tractor passes.

The weight of this 34-in. line proved too much for standard side-boom tractors. To balance the heavy pipe the center of gravity of the tractors was shifted. To do this the axles were extended and the left track moved outward. Counterbalances were added to place the center of gravity far enough to the right to balance the load of the pipe. The pipe weighs about 2 tons per 30-ft. length.

The cleaning-painting machine and the asphalt - applying - and-wrapping machine both required a series of minor changes and alterations. Most of these were made from time to time as the project got under way. In general the changes were made to smooth the operation of tried equipment on larger-than-usual pipe. As an example, an air line was installed on the pipe cleaner to blow brushed dirt away from the section of pipe being painted, and permit the even application of paint.

All parts of the spread and office can be reached by short-wave radio. The station is a 50-watt installation located in the superintendent's trailer. The mobile stations are in jeeps all having the same call letters.

Pacific Gas & Electric has also installed a radiophone transmitter. It is located in its temporary Hollister office. From that point the engineer in charge maintains communication by two-way radiophone with six cars carrying inspectors and enginers along the moving spread.

For the leg of the line now nearing completion a double-ending plant was installed near Santa Clara. Thirty-foot lengths of pipe were delivered directly to this plant from Consolidated Western Steel Corp. in South San Francisco. At the double-ending plant these lengths of pipe are welded together into 60-ft. lengths and, if road conditions permit, into 90-ft. lengths.

Pipe is unloaded from incoming trucks by fork-lift truck and placed on level roll-down rails. They are set on the rails in pairs. The fork-lift truck that handles the 30-ft. pipe lengths has a specially designed grip for holding the pipe. After the fork is run under the pipe, hydraulic grabs come down and engage the pipe from the top. The operator controls the pressure of these arms. With this device the pipe is held securely and allows easy and rapid handling of the load.

The pipe as received has a 30 bevel at each end. Pipe lengths are lined up and the ends squared for joining by means of a "bug." This device is run in the pipe and forms a bridge at the point of junction. It also holds the pipe lengths exactly 3 32 in. apart to permit full penetration of the weld.

Lowering the pipe in. Use of the specially developed Caterpillar with an extra 18-in. offset axle is shown in this picture. The offset axle was developed by Bechtel in conjunction with the manufacturer and serves to decrease need for excessive counterweights. The cap on the end of the pipe protects it from being filled with debris before it is connected into the next section.

The lengths are then tack-welded, the "bug" moves out, and the double length is carried by an hydraulic lift to another set of roll-down rails. Here a complete bead is manually applied as a jig revolves the pipe. Controls for this operation are worked by the welder through a pedal.

From this jig the pipe goes to the final welding operation. The last bead is applied by machine and the pipe is conveyed on electrically driven rollers to the storage area. Here welds are inspected with gamma-ray inspections being made at intervals, providing a complete picture of the weld.

The work of this plant at Santa Clara was finished some time ago. It has now been moved and is set up near Barstow where double-ended pipe is now being stockpiled in advance of the move of the construction crews to the Topock area.

The choice of 34-in. pipe as against 30-in. pipe, which was originally planned for the line, was made after a study of capital and operating costs involved. Although use of 34-in. pipe represented better than $2,000,000 added cost, there were bigger savings that could be made using larger pipe.

First, the use of 30-in. line would have meant the construction of an additional compressor station. This consideration alone more than makes up the difference in cost of the pipe. The total horsepower needed to move 400 million cubic feet of gas through the smaller line figured to be 20 per cent greater than that for the 34-in. line. Total savings, after allowing for the increased cost of the larger pipe, amounts to about ½ cent per cubic foot delivered at Milpitas.

Some Theoretical Aspects of CYCLING

PART 2

by Dr. Morris Muskat*

Retrograde Condensation About Well Bores

EVEN if complete pressure maintenance is achieved by cycling, the process of gas withdrawal through the producing wells will require a pressure drawdown, and result in retrograde liquid accumulation about the well bore. This will lead to a buildup of condensate saturation until mobility develops, after which further liquid accumulation will be swept into the well bore with the wet-gas stream. The radius to which the limiting saturation for mobility has been built up will expand as production continues, resulting in an increasing loss of condensate content, except for ultimate vaporization during blowdown, or by dry gas invasion. The magnitude of these losses can be formally calculated from the equation:

$$\frac{d\rho}{dt} = \frac{Q}{2\pi rhf}\,\frac{dp}{dr}\,\frac{dC}{dp} \qquad (1)$$

where ρ is the condensate liquid saturation at the time t and radius r, Q is the rate of gas withdrawal, p the pressure at r, h the sand thickness, f the porosity, and C is the liquid content of the reservoir vapor per unit volume.

Assuming steady-state flow conditions, with a logarithmic pressure distribution undisturbed by the development of the liquid condensate phase,† Equation 1 can be rewritten as:

$$\frac{d\rho}{dt} = \frac{\mu Q^2}{4\pi^2 h^2 k f r^2 p}\,\frac{dC}{dp} = \frac{k/\mu}{4f r^2 p}\,\frac{(p_e^2 - p_w^2)^2}{(\log r_e/r_w)^2}\,\frac{dC}{dp} \qquad (2)$$

where

μ = wet gas viscosity
k = its effective permeability
p_e, p_w = the boundary pressures
r_e, r_w = the external and well radii respectively

Equation 2 shows that the rate of liquid accumulation will be essentially proportional to the square of the production rate or the pressure drawdown. For a fixed withdrawal rate it will vary inversely as the permeability, thus being more serious for tight than for permeable reservoirs. On the other hand, for fixed pressure drawdowns, it will be proportional to the permeability, and hence will be greater in permeable than in tight sands. It will also be noted that except for the term dC/dp, the rate of buildup of saturation of the condensate liquid varies inversely as the square of the radius.

To provide a numerical example of these equations, data were used approximating the reservoir fluid and rock characteristics of a California field. The quantity dC/dp was computed from the liquid condensation curves derived from a laboratory study of the actual reservoir fluids,‡ although the exact conditions under which liquid accumulation about a well bore develops are not identical with those in the laboratory depletion experiment.

The variation of dC/dp, in the range of pressure above the point of maximum condensation, as computed for the fluids in question, is plotted in Fig. 1. For convenience and subsequent calculations, the actual ordinates in Fig. 1 are the values of dC/dp^2 expressed as cubic feet of liquid accumulation per cubic foot of gas produced per psi. Assuming, in addition, a producing rate for the well of 10 M.M.c.f. per day, with a reservoir pressure of 4,750 psig. and a bottom-hole flowing pressure of 4,600 psig., an average net pay thickness of 130 ft., a porosity of 20 per cent, and a well spacing of 160 acres per well, Equation 2 can be expressed numerically as:

$$\frac{d\rho}{dt} = \frac{0.99 \times 10^{-10}}{r^2}\,\frac{dC}{dp^2} \qquad (3)$$

*Gulf Research & Development Co. This article is the second part of a paper presented and the technical program, production engineering conference, Gulf Oil Corp., Pittsburgh. Part 1 of the paper appeared in the Journal, January 19, pages 55-60.

†In view of the other assumptions involved in the analysis, this simplification should not be serious from a practical standpoint; cf. also M. G. Arthur, A.P.I.

‡These data were kindly supplied the writer by Dr. H. T. Kennedy.

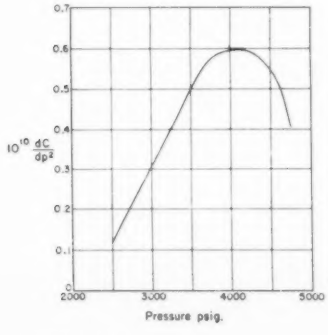


Fig. 1—(Left) Cubic feet of liquid accumulation per cubic foot of gas produced versus pressure (psi.)

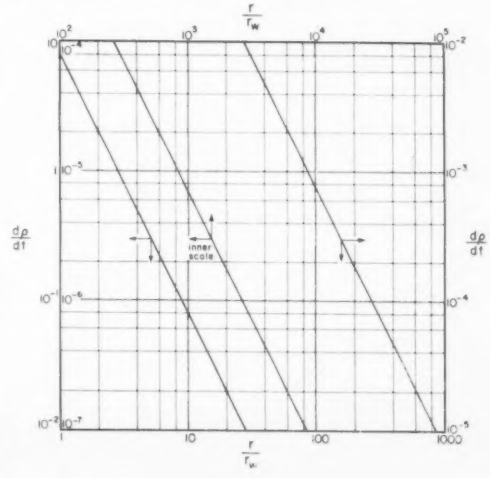


Fig. 2—(Right) Rate of change of condensate liquid saturation versus radius ratio of well

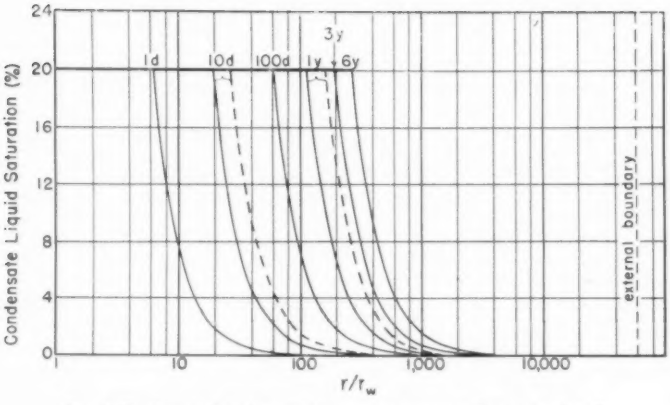


Fig. 3—Condensate liquid saturation per cent versus radius ratio of well

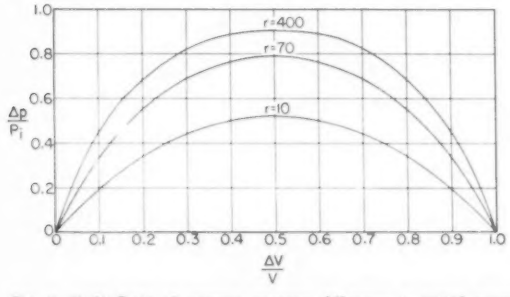
where r is to be expressed in feet. The above numerical constants correspond to an effective gas permeability of 9.4 md., assuming a gas viscosity of 0.027 cp. Equation 3 is plotted vs. r/r_w in Figure 2, r_w being the well radius, ¼ ft.

The application of Equation 3 or Fig. 2 is obvious. Under the conditions assumed, condensed liquid will accumulate at each radial distance from the well bore at a constant rate given by Equation 3 until the saturation reaches a limiting value for mobility, after which the excess and continued condensation will be swept into the well bore with the gas phase. Assuming that this limiting saturation for mobility is 20 per cent, the saturation distribution curve so calculated is plotted in Fig. 3 at different times in the producing history. It will be seen that these all start with a flat segment corresponding to the buildup to the saturation limit, and then decline sharply, approximately proportional to the inverse of the square of the radius from the well bore.

For example, even after 1 day production, the limiting saturation will have been built up out to a radius ratio of 6.2, after 10 days to a radius ratio of 19, after 100 days to a radius ratio of 61, etc. Since the flowing wet gas will not be losing liquid after it passes the radius at which the critical saturation has been built up, its apparent dew-point pressures will correspond to the pressure at this limiting radius. Assuming again that the pressure distribution corresponds to a steady-state radial system of uniform permeability, also assumed in developing Fig. 3 and Equation 3, the dew-point pressure of the resultant flow stream should continually increase as production continues. Comparing the terminal points of the flat segments of Fig. 3 with the radial pressure distribution, it is found that these dew points will be 4,632 psig. after 1 day, 4,652 after 10 days, 4,672 after 100 days, 4,682 after 1 year, 4,692 after 3 years, and 4,700 after 6 years, compared with the assumed initial reservoir dew-point pressure of 4,750 psig.

The implication of these changing dew-point pressures would appear to be that the sampling of condensate-producing wells early in their life would give dew-point values which are too low, and such as would be suggestive of undersaturation of the reservoir gas. Actual sampling experience in condensate wells, however, does not indicate consistently low reservoir dew-point pressures as compared to original reservoir pressures. In fact, in most cases the laboratory-determined dew-point pressures have agreed with the original reservoir pressures within experimental errors. The reason for this may lie in the possibility that under the high-pressure gradients immediately about a well bore it is possible to flush lower saturations of condensate liquid than would be expected from relative-permeability measurements made under moderate pressure gradients. Moreover, it is conceivable that the first liquid condensation which develops on pressure decline is comprised of globules small enough to flow through the pore space with little filter action. In any case, the calculations should give maximum effects of the liquid condensation, compared to those which might occur in practice.

From the point of view of reservoir losses associated with these condensation effects, the curves of Fig. 3 imply that under the conditions assumed they will be of only minor importance. Even after 6 years, the radius ratio for a buildup of 20 per cent liquid saturation is 275, which corresponds to a radial distance of about 70 ft. This represents about 0.2 per cent of the total drainage area for the well. The liquid accumulation referred to in these calculations represents the total liquid phase, including not only the stable heavy-liquid components, but the intermediates and the lighter gases, methane and ethane, as well. During the pressure-depletion phase of the cycling operations, after the pressure of maximum condensation is reached, much of this liquid accumulation would automatically vaporize; at least the lighter components would be recovered with the residual wet gas. In addition, it is to be expected that when dry gas invades the area about the well bores and passes through the



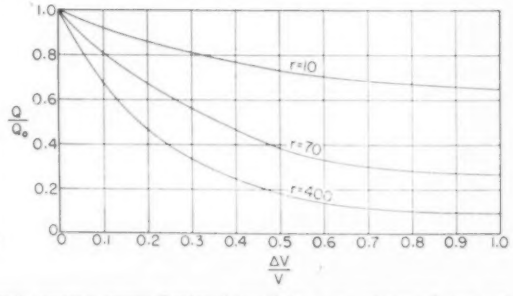


Fig. 4—(Left) Ratio of extreme pressure difference to initial reservoir pressure versus fractional cumulative gas withdrawal from reservoir (for three values of the stratification constant r). Fig. 5—(Right) Ratio of actual production capacity to that if pressure were strictly uniform, versus fractional cumulative withdrawal from reservoir

pores containing the condensed liquid phase, much of it will be vaporized into the dry-gas stream even during the cycling phase.

To indicate the effect of absolute production rate on condensate liquid accumulation additional calculations were made under the assumption that the producing rate is 20 M.M.c.f. per well per day, with the same physical characteristics of the rock and fluids, except for the assumption that sand permeability has been doubled so that pressure drawdown remains the same. Corresponding results after 10 days and 1 year of production are shown as the dashed curves in Fig. 3. As is to be expected, the amount of liquid condensation is higher at the greater producing rate, although the total effect due to doubling the producing rate is still small.

As previously indicated, in a given sand the rate of liquid condensation will be essentially proportional to the square of the producing rate or to the square of the pressure drawdown. However, since the numerical conditions assumed for the illustrative example discussed above already refer to a reservoir of low effective permeability with a rather high producing rate, it is doubtful if really serious losses will result from these condensation effects in any condensate reservoir operations that are likely to be carried on.

Differential Depletion

Associated with the effect of permeability nonuniformity in reducing sweep efficiency during cycling operations is the differential depletion that will take place during normal pressure depletion or blowdown operations. In estimating the recoveries by pressure depletion or during blowdown it is usually assumed that the state of abandonment will be described by an average or uniform pressure throughout the producing formation. However, just as in the case of all oil-producing reservoirs, depletion operations will lead to development of different pressures and degrees of recovery from regions of different permeability.

Those of high permeability will be depleted most rapidly and to the greatest extent, whereas the tight zones may remain much less depleted when producing operations become unprofitable. Quantitative analysis of this problem has long faced reservoir engineers and no satisfactory solution is as yet at hand. In order to obtain any evaluation of the effects involved it is necessary to assume extremely idealized types of nonuniformity such as perfect stratification. The validity of such a simplification is subject to more serious question in the case of pressure depletion or blowdown operations than when applied to the cycling phase of condensate-reservoir development. While the related assumption of no crossflow would be satisfied if the reservoir were actually a simple stratified system, crossflow will not automatically be eliminated when the pressure in different strata declines at different rates.

The effect of assuming the absence of crossflow must be introduced as a supplementary consideration, and will again involve additional assumptions and approximations. The following discussion will present a treatment of the differential depletion in a stratified system with the assumption of no crossflow, where the permeability distribution is of the exponential type. To simplify the analysis, it will be further assumed that during the pressure depletion or blowdown period the wells are producing wide open, with zero bottomhole flowing pressures.

On the basis of these assumptions the pressure p (z) at any lamina z, where permeability is k (z), will be given by the equation:

$$Q(z) = \frac{\partial p}{\partial t} = ck(z)\,p^2 \qquad (4)$$

where the simplification has been made that the gas phase follows ideal gas laws, and where the pressure variation about the well bore has been neglected. In Equation 4, Q (z) is the production rate per unit thickness at z, and c is a geometrical constant. The solution of Equation 4 is evidently:

$$p(z) = \frac{p_i}{1 + ct\,p_i\,k(z)} \qquad (5)$$

where

p_i = initial pressure.

Applying the exponential permeability distribution, as given by Equation 5 (Part 1) it may be shown that the strata of minimum and maximum permeability will have respectively maximum and minimum residual pressures at any state of cumulative withdrawal, such that their difference will be given by:

$$\frac{p_{max} - p_{min}}{p_i} = \frac{\Delta p}{p_i} = \frac{(r - r^{\Delta V/V})\,(r^{\Delta V/V} - 1)}{(r-1)\,r^{\Delta V/V}} \qquad (6)$$

where

$\Delta V/V$ = fractional cumulative withdrawal from the reservoir.

Equation 6 is plotted in Fig. 4 at three values of the stratification constant r. As cumulative production continues, the difference in extreme pressures increases to a maximum, when half of the reservoir content has been withdrawn, and then declines again symmetrically to the limit zero when the reservoir is uniformly depleted to atmospheric pressure. The magnitude of these differential pressures is surprisingly large even for the relatively uniform reservoir where r = 10.

When half the reservoir content has been removed the difference in extreme pressures would be about 52 per cent of the initial value. For a nonuniform reservoir, such as would correspond to r = 400, the pressure in the tighter zone after 50 per cent depletion would exceed that in the most permeable zone by 90 per cent of the original pressure. These differentials decrease toward the later stages of the withdrawal history, but still would remain quite large after 90 per cent total fluid withdrawal. Even for r = 10, the extreme pressures would differ by 600 psi. after 90 per cent withdrawal of the reservoir content, if the initial pressure were 3,000 psi.

Associated with such differential pressures are two effects. First, differences in absolute recovery during pressure depletion, and second, differences in residual production capacity at any state of cumulative withdrawal, compared to the calculated production capacity if there were no differential depletion. Thus, applying data determined for a Gulf Coast reservoir, the assumption of a uniform pressure depletion to 500 psi. would imply an over-all gross recovery of the C_5+ content of 59 per cent. If r were 400 for this reservoir, then after 75 per cent total withdrawal recoveries would range from 64 to 17 per cent between the most permeable and tightest zones. Such a variation in the recovery might affect materially the economic analysis of the producing operations.

The effect on the resultant production capacity will also be of importance. Average abandonment pressure for a condensate reservoir is usually determined in terms of limiting production capacities of producing wells. Because highest permeability zones will be reduced to much lower pressure than tighter strata during pressure depletion, the resultant well capacity at any given mean reservoir pressure will be lower than if the reservoir pressure were assumed uniform throughout. It may be shown that at any state of fractional cumulative withdrawal, represented by $\Delta V/V$, the ratio of actual production capacity to that if the pressure were strictly uniform would be:

$$\frac{Q}{Q_o} = \frac{1}{r^{\Delta V/V}} \left[\frac{r - r^{\Delta V/V}}{(r-1)\,(1 - \Delta V/V)} \right]^2 \qquad (7)$$

Equation 7 is plotted in Fig. 5 for three values of the stratification constant. It will be seen that the re-

(Continued on page 60)

F A M O U S

Caustic Comments

A famous author-humorist had finished an after-dinner speech. The next speaker, an attorney, rose, shoved his hands deep into his pockets, as was his habit, and laughingly remarked, "Doesn't it seem a little unusual that a professional humorist should have to try so hard to be funny?"

Drawled the humorist in a caustic manner, "And doesn't it seem a little unusual that a lawyer should have his hands in his *own* pockets?"

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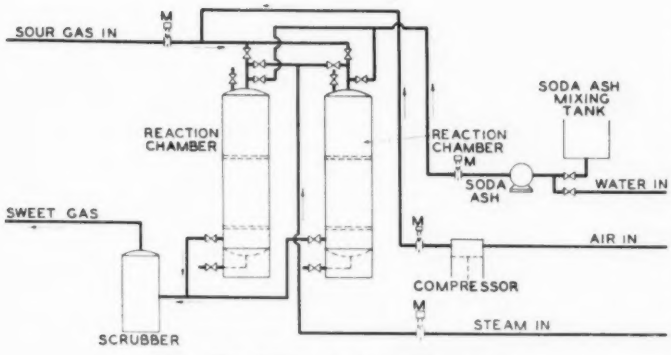

Fig. 1—Flow diagram of an iron oxide gas treater

Operating Problems Related to

GAS TREATING

by J. S. Connors* and A. J. Miller*

"GAS TREATING," as discussed here, is limited to operations for hydrogen sulfide removal only. However, it should be noted that where carbon dioxide also is present many of the methods for hydrogen sulfide removal will remove carbon dioxide; and therefore, its presence must be evaluated in the selection and operation of the treating process. In general the chemical processes employed for these purposes may be roughly classified as either batch or regenerative operations.

Batch-type treatment.—The caustic-soda and lime-slurry processes are typical examples of the batch-type process and are well known. These processes are not generally used in large-scale operations due to the high reagent cost and the serious problem of disposing of the sulfides produced as end products.

The iron-oxide process is another example of the batch process and is the old standby of the utility companies in the treatment of manufactured gas. With some slight modifications this process can be adapted for use in the treatment of natural gas at fairly high pressures in cases where the volume of gas to be treated is not large and where the hydrogen sulfide content is low. This process has an advantage over the caustic-soda or lime-slurry processes in that the treating reagent is not appreciably affected by the presence of carbon dioxide in the gas.

In the modified iron-oxide process, wood shavings impregnated with iron oxide and called "iron sponge" are placed on trays inside a pressure vessel and the gas is passed downward through the beds. Fig. 1 shows a flow sketch of this process.

The iron sponge is available as a commercial product which contains 9 lb. of iron oxide per bushel of material. In actual operation, iron sponge is not effective unless it is kept moist and slightly alkaline. Therefore, when the sponge is placed in the chamber approximately 1 lb. of soda ash is added for each bushel and the whole mass is thoroughly dampened before any gas is processed. The moisture content is critical and the bed must be kept damp while in operation. In order to accomplish this either the gas being treated must be water saturated or water must be added continuously, otherwise the bed will dry out and fail to function. A convenient method of adding water is to inject steam into the gas just before it enters the treating chamber.

It is also important that the gas temperature be held above approximately 80° F. At lower temperatures the reaction velocity is considerably decreased and the beds will cease to treat effectively long before they are spent.

When the gas to be treated contains no oxygen the theoretical life expectancy of the beds is the removal of 5.76 lb. of hydrogen sulfide per bushel of iron sponge. In actual practice this is seldom obtained and for design purposes a life expectancy of approximately 50 per cent of the theoretical appears more practical. The spent beds may be regenerated by first thoroughly soaking them with water and then removing them from the chamber. The wet material removed is spread out on a concrete slab in a layer of 12-15 in. deep and turned over with a fork once a day for several days. The oxygen of the air oxidizes the iron sulfide back to iron oxide with the formation of free sulfur.

Necessary Precautions

Precautions must be taken to keep the regenerating mass damp at all times, otherwise the heat of reaction will cause the shavings to burn. Such regenerated material may be reused several times; however, the formation of fines due to handling will increase the pressure drop in the process when the regenerated material is again placed in service. In cases where pressure drop is critical, it is our practice to mix equal volumes of new iron sponge with regenerated sponge rather than to use all regenerated material.

When oxygen is present in the gas to be treated, life expectancies even greater than theoretical can be obtained, since the oxygen will allow for simultaneous regeneration along with hydrogen sulfide removal. In this case, it may be necessary to remove the beds from service and discard them before they are spent because the formation of free sulfur in the regeneration reaction results in cementing the sponge bed into a hard compact mass making removal difficult and pressure drop excessive.

One such treater consisting of a single 6 by 25-ft. tank, holding a charge of 400 bu. of iron sponge mixed with 500 lb. of soda ash arranged on three trays, is currently treating approximately 1,750,000 standard cubic feet per day of gas. Composition of the gas processed in this unit is:

Component—	Mol per cent	Gr./100 cu. ft.
H_2S	0.0095	6
CO_2	0.40	
O_2	0.10	
Hydrocarbon	99.49	

Gas temperature is approximately 80° F. and the gas is water saturated. The operating pressure is approximately 90 psig. Superficial gas velocity is approximately 6.5 ft. per minute at operating temperature and pressure.

This treater should be expected to remove a total of 2,300 lb. of hydrogen sulfide if 100 per cent of the theoretical conversion of iron oxide (Fe_2O_3) to iron sulfide (Fe_2S_3) could be obtained. In actual operation a total of 1,995 lb. of hydrogen sulfide was removed in treating 232,369,000 cu. ft. of gas before the effluent gas became sour to the doctor test. This was a life expectancy of 86.7 per cent of theoretical.

As an experiment the gas flow through the beds was reversed and good treating was again obtained. To obtain these results, it was necessary

*Phillips Petroleum Co., Bartlesville, Okla. Paper given at N.G.A.A. regional meeting, Amarillo, Tex.

to add a small quantity of water to the treater once each tour.

Regenerative processes. — In the treatment of natural gas where the quantity of hydrogen sulfide to be removed is high the regenerative processes are usually employed. There are many of this type, those commonly used in this country have been the soda-ash, the phenolate, the tripotassium phosphate and the amine processes. Flow sketches of these processes are shown in Figs. 2, 3, 4, and 5.

The soda-ash process was the pioneer of this type treater. However, they all employ the cycle of absorption and stripping but differ in the absorption media. The development of the absorption and stripping cycle gas treaters has progressed today to the point where the producer of sour gas can compete with the producer of sweet gas for the pipe-line market both on a price and quality basis.

For purpose of brevity, the discussion of operating problems on this type of treater will be limited to those of the amine process treaters only. Approximately 20 such units varying in size from treaters with a capacity of 1 million standard cubic feet to more than 160 million, processing gases with a wide variation in hydrogen sulfide and carbon dioxide concentrations, are currently operated by Phillips Petroleum Co. Table 1 shows some data concerning these units.

Treater "A," an amine type, was placed in operation about 10 years ago. This plant processes approximately 4,000,000 standard cubic feet per day of a mixture of propane and ethane using a 10-15 per cent solution of monoethanolamine (MEA) in water as the treating agent. Experience with this unit has furnished a pattern for future guidance.

The treater was operated with excellent treating efficiency reducing the hydrogen sulfide content of the gas from 600 gram per 100 cu. ft. to less than .05 gram per 100 cu. ft.; but since we also desired to partially dehydrate the gas stream, after 8 months of operation, the treating solution was changed to a mixture of approximately 75-90 per cent diethanolamine (DEA) and MEA and 10-25 per cent water. Treating efficiency decreased slightly and the degree of dehydration expected was obtained. Steam at 250 psig. and 404° F. was used to heat the kettle to 308°-318° F. Corrosion occurred in the heat exchangers which were replaced after a total service life of about 19 months.

Operations were adjusted so that the kettle temperature was maintained at approximately 290°-300° F. and a program of solution analysis was inaugurated, the results of which are shown in Table 2. The second set of heat exchangers had to be replaced after 8 months of operation, and at this time the stainless-steel heating element was found to be corroded.

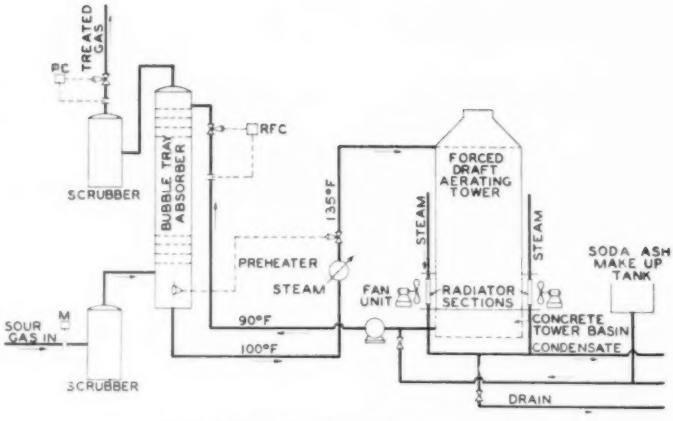

Fig. 2—Flow diagram of a soda ash gas treater

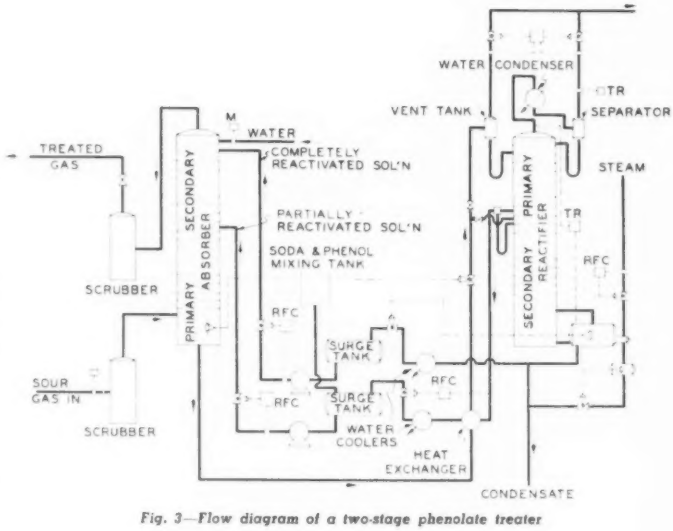

Fig. 3—Flow diagram of a two-stage phenolate treater

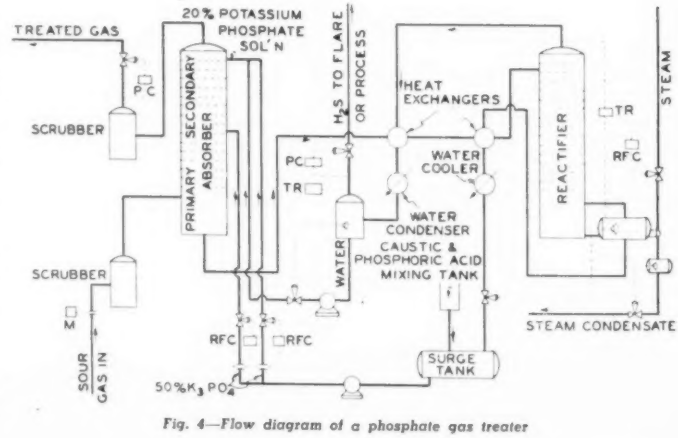

Fig. 4—Flow diagram of a phosphate gas treater

and some of the areas where the tubes were welded to the tube sheet were leaking. The still kettle at the liquid level was also corroded.

It is believed that the three most likely causes of the corrosion were:

1. Carbonyl sulfide present in the gas.
2. Carbon disulfide present in the gas.
3. Overheating of the solutions.

The first two were found not to be present and the entire solution was discarded and a new solution containing approximately 40 per cent DEA, 35 per cent diethylene glycol (DEG), and 25 per cent water was added. Steam used to heat kettle was changed from 250-psig. live to 100-psig. exhaust steam. Kettle temperatures were held below 265° F. The unit was operated on this basis for several years without any noticeable additional corrosion. Thereafter, it was decided that since dehydration was no longer required the practice of adding glycol could be discontinued.

At the present time the solution is 20-25 per cent DEA and 80-75 per cent water. The kettle temperature is approximately 240° F. It is interesting to note that with the exception of the replaced heat exchangers, this unit is operating with all of the original equipment intact.

Treater "B" was placed in service about 8 years ago as a combination treater and dehydrator using a solution containing approximately 50 per cent DEA, 5 per cent MEA, 35 per cent DEG, and 10 per cent water. Operators were instructed not to allow the kettle temperature to exceed 280° F. Live steam at 250 psig. was used to heat the kettle. The addition of DEG was discontinued soon after startup and the treater operated on a low MEA—50 per cent DEA mixture in water. However, after 10 months of operation, the heating element had to be replaced and it was believed that the maintenance of a low liquid level in the kettle allowing exposure of the top section of the bundle was the cause of the corrosion. The bundle was replaced. In the following 3½-year period, many of the tubes developed leaks and had to be plugged. During this period the solution was gradually changed, replacing the DEA with MEA. The addition of an organic chromate inhibitor to the solution was also tried. Approximately 4 years ago the heating element was again replaced and the steam supply to the element was changed from 250-psig. live steam to 40-psig. exhaust steam. To date, no further corrosion has been experienced on this unit.

Treater "H" was placed in operation slightly over 4 years ago treating the same gas as treated by Treater "B." Operating conditions were decidedly different. Treater "B" had been operated with a kettle temperature of 238° F. while Treater "H," due

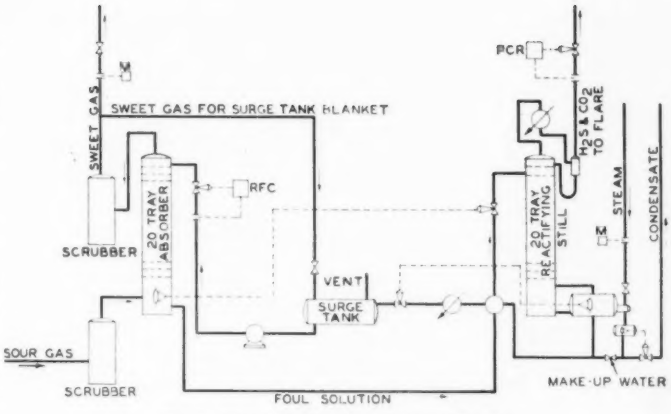

Fig. 5—Flow diagram of an amine gas treater

to operating the still at elevated pressure (35 psig.), had a still-kettle temperature of approximately 290° F. After 2 years of operation, the unit was in very poor shape. There had been numerous leaks in the foul-solution piping, heat-exchanger heads, in the bottom one-third of the absorber and in the top of the still. Metallurgical examinations using Magnaflux disclosed that the leaks were caused primarily by stress corrosion with considerable general corrosion in certain areas. In addition to the points where the equipment was actually leaking, numerous other cracks were found. The areas affected by stress corrosion were all in the vicinity of welds but not in the weld metal. The solution when analyzed was found to be mildly corrosive.

The vessels were sent to the shop where all cracked areas were repaired and they were then stress relieved. New piping was fabricated and the operating conditions were changed so that all exhaust steam (40 psig.) was used in the kettle elements and the kettle temperature was held at approximately 240° F. Since this has been done there has been no further evidence of corrosion.

Treater "C" was started approximately 8 years ago using 40-psig. exhaust steam in the element and with kettle temperature held at 240° F. This treater has been in continuous operation since that time without appreciable corrosion. Treater "G" operated on the same gas as Treater "C" with operating conditions similar to those of Treater "H," also had to be rebuilt after approximately 2 years' operation. It is interesting to note that since it was impossible to repair the absorbers these were replaced with second-hand riveted vessels which were seal welded and not stress relieved. Upon changing the operating conditions to approximate

TABLE 1—DATA ON AMINE GAS TREATERS
Capacities from 1,000 to 160,000,000 standard cubic feet per day

Designation and type gas treated—	Acid gas content H_2S Gr./100 cu. ft.	Acid gas content CO_2 Mol %	Treating solution %
A—Ethane propane	600-1,200	.025	DEA—20-25
B—Residue gas	400	4.2	MEA—15-20
C—Residue gas	1,400	1.5	MEA—15-20
D—Residue gas	450	4.0	MEA—15-20
E—Residue gas	880	4.9	MEA—15-20
F—Raw gas	70-90	0.3-0.6	MEA—15-20
G—Residue gas	1,400	1.5	MEA—15-20
H—Residue gas	400	4.2	MEA—15-20
I—Residue gas	4,200	3.5	MEA—15-20
J—Residue gas	1,700	4.8	MEA—15-20
K—Residue gas	1,700	4.8	MEA—15-20
L—Residue gas	1,700	1.0	MEA—15-20
M—Residue gas	75	0.8	MEA—15-20
N—Raw gas	70-90	0.6	MEA—15-20
O—Raw gas	65	0.15	MEA—15-20
P—Synthesis gas	——	17.0	MEA—20-25
Q—Raw gas	30	0.2	MEA—15-20

TABLE 2—ANALYSIS OF AMINE SOLUTIONS FROM TREATER A

Date—	7-5-40	9-4-40	1-6-41	6-6-41	9-15-41
Amine as MEA by Kjeldahl wt. per cent	57.0	56.7	52.3	47.9	50.8
Amine as MEA by titration wt. per cent	55.7	55.2	48.8	43.3	41.0
Other N_2 compounds as MEA wt. per cent	1.3	1.5	3.5	4.6	9.8
MEA by Van Slyke wt. per cent	15.2	9.7	5.5	3.2	5.1
DEA by calculation wt. per cent	67.9	80.0	80.5	76.9	78.8
Water by Bidwell Sterling	——	——	11.6	14.0	7.9
Total	84.9	89.7	97.1	94.1	91.8
Unaccounted for	15.1	10.3	3.9	5.9	8.2
Iron capacity in p.p.m	——	——	1,850	2,750	8,000

those of Treater C and upon reclamation of the corrosive solutions there has been no further sign of corrosion on this unit.

Another common cause of both general and stress corrosion may lie in allowing oxygen to come into contact with the treating solution in external surge tanks. This can be eliminated by blanketing the surge tanks with sweet gas from the absorbers.

When the gas to be treated contains oxygen as well as hydrogen sulfide there will be a considerable formation of amine thiosulfate in the treating solution. This amine thiosulfate is not regenerated in the ordinary manner and will eventually build up sufficiently so that most of the amine is not available for hydrogen sulfide removal. When this occurs the amine can be freed by the addition of small quantities of soda ash to the solution. The addition of soda ash results in the formation of sodium thiosulfate and amine carbonate, the latter being decomposed in the still and the amine solution regenerated in the normal manner.

When the quantity of sodium thiosulfate is deemed excessive (in cases when MEA is used as the treating solution) the solution can be reclaimed by simple redistillation in a semicontinuous process with very little equipment. Similarly corrosive solutions can also be reclaimed by the same method. Where several treating plants are located in the same area, it has been found convenient to build portable reclaimers which can be loaded on a truck and transported from plant to plant as needed.

In operation of the cyclic process treaters, a small quantity of water is continuously lost from the solution in the regeneration stage. Thus, any nonvolatile impurities present in the water used to make up the treating solution will tend to concentrate and eventually deposit out in the form of scale. Therefore, it is our practice to use only steam condensate in the original solution and to provide facilities so that steam condensate can be added semicontinuously in order to keep both the solution strength and volume at the desired levels.

In general, it may be said that in all raw-gas treaters considerable operating difficulty is caused by foaming in the absorbers. It is believed that this foaming is caused by soaps formed by the reaction of the alkaline solution with minute traces of naphthenic acids in the raw gas. This difficulty can be eliminated by adding small quantities of an antifoam agent, such as commercial oleyl alcohol or stearyl alcohol. These alcohols, due to their limited solubility, should be added via pump suction to insure dispersal into the treating solution. It is better to add the antifoam agents continuously, a drop at a time, but they will also perform satisfactorily if added in slugs of 3 or 4 ounces every 4 to 6 hours. The efficiency of such antifoam agents may be judged by their performance at plant "F" where because of foaming in the absorbers its capacity was reduced to less than 20,000,000 standard cubic feet per day. By adding less than 16 oz. of antifoam agent via pump suction continuously per day capacity was increased to more than 63,000,000 standard cubic feet per day.

All gas-treater solutions carry small quantities of iron sulfide in suspension. Over a period of time these particles grow and become large enough to settle out. This action results in the formation of a black sticky mass which plugs liquid-level control connections, gage-glass connections, and will in time interfere with heat transfer. It has been found that if approximately 10 per cent of the circulating solution is continuously filtered the solutions can be kept in their original state and practically all black residue eliminated. One very effective filter is the Infilco Stellar filter using diatomaceous earth as a filter aid.

Acknowledgment

The flow sketches shown in Figs. 3, 4, and 5 are based on the work of others but have been modified to include modern operating controls.

Fig. 3 is based on material contained in an article by G. M. Carvlin entitled, "The Use of Sodium Phenolate for Hydrogen Sulfide Removal."

Fig. 4 is based on material contained in an article by T. W. Rosebaugh entitled, "The Shell Phosphate Process for the Removal of Hydrogen Sulfide."

Fig. 5 is based on material presented in a paper by L. L. McWilliams at the twenty-sixth annual meeting of the A.P.I., November 12, 1946.

Some Theoretical Aspects of Cycling

(Continued from page 55)

duction of flow capacity may be quite serious, under the assumed conditions, except for uniform reservoirs. This would imply appreciably higher abandonment pressures than would be predicted from the assumption of complete reservoir uniformity, if the abandonment pressure is still to be fixed in terms of the minimal productive capacity of the wells.

The effects on differential recovery and on net productive well capacity, as indicated by Figs. 4 and 5, represent the worst conditions that would be encountered in practice. This results from the assumption of no crossflow. By taking into account the consequences of ideal stratification as outlined here, the estimates of recovery and well productivity will be conservative.

It is difficult to develop even an approximate treatment of the modifications of the above idealized results that might result due to crossflow. As an alternative to laborious numerical treatments, one may arbitrarily assume that the resultant effect of the crossflow is to create a uniform reduction in the pressure gradients, the degree of this reduction representing an index which might be a measure of the effect of the crossflow. This representation will lead to a new pressure distribution within the stratified formation given by:

$$p_c(z) = ap' + (1 - a)\, p(z) \qquad (8)$$

where

p_c = the pressure distribution including the effect of crossflow

p' = the mean reservoir pressure corresponding to the cumulative withdrawals

$p(z)$ = the pressure distribution without crossflow

a = the parameter representing the index giving the degree of crossflow

The mean pressure implied by p_c is the same as that without crossflow, p'. The maximum pressure difference between the tightest and most permeable areas implied by Equation 8 is now reduced to:

$$\Delta p_c = (1 - a)\, \Delta p \qquad (9)$$

Thus, if the crossflow index, a, is 0.5, maximum pressure differentials as calculated by Equation 6 would be reduced by a factor of two.

It is possible to calculate resulting productive capacities of the wells corresponding to the distribution of Equation 8. These will uniformly increase with the parameter, a, from the extreme value given by Equation 7 for $a = 0$, to a value corresponding to complete reservoir uniformity for $a = 1$. A similar variation with a will result when calculating the mean depletion recoveries. Unfortunately, however, it is not feasible to predetermine what the value of a should be, and it may be necessary to virtually guess its value if this type of correction is to be applied.

The same factors of nonuniformity which will lead to imperfections in sweep efficiency of condensate-producing reservoirs during cycling will also result in reduced recoveries and well capacities under pressure depletion or blowdown. Crossflow effects will lessen the importance of permeability nonuniformity during pressure decline more than during cycling operations. While it would be well to attempt some correction for effect of nonuniformity in analyzing condensate-reservoir-development programs whenever such is possible, comparative evaluation of cycling and pressure-depletion operations should be less seriously affected by the simplifying assumption of reservoir uniformity than will be absolute recoveries and profits by either method.

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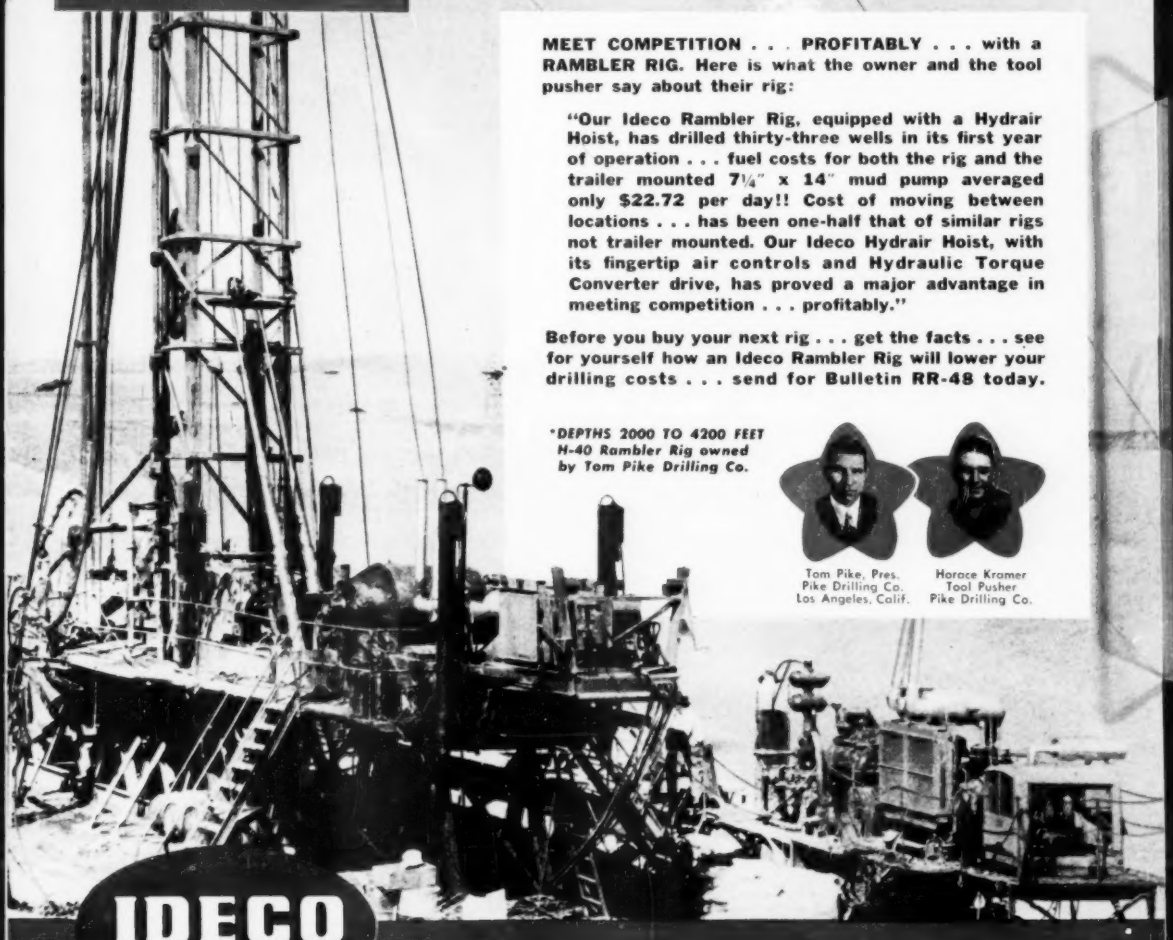

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Gas Compressor Lubrication

Actual trial of a given lubricant is more important than the specification of a set of numbers which at times have little connection with lubricating value

by F. M. McNall* and E. H. Flaherty*

EXPERIENCE has shown that several factors contribute to the problem of lubricating compressor cylinders and piston-rod packing. These factors can be placed under the following general headings:

1. Ratio of compression at which the cylinder is operating.
2. Operating pressure of the cylinder.
3. Jacket-water temperatures of the compressor cylinder.
4. Type of gas that is pumped.
5. Single-stage of multistage operation.
6. The amount of dirt and contamination in the gas.
7. Proper maintenance of compressors.

Before any of the above general factors are discussed, it might be well to mention one of the theories that have been advanced regarding the lubrication of compressors in general. The theory states that it is not necessary to have a high-flash-point oil even though the discharge temperature of the gas may be high. The flash point of the oil goes up with pressure and if the discharge temperature of the gas was actually at the same temperature or higher than the flash point of the oil for the pressure involved, autoignition would not take place because the oil will not burn unless contacted with a flame.

High-flash-point oils are necessarily paraffinic in nature and tend to form a hard carbon residue when in contact with heated metal surfaces, such as valve disks or even with cylinder walls and compressor packing when the compressor cylinder is not in good operation. Naphthenic-based oils have lower flash points with a lesser degree of carbon deposits and the carbon formation is of a softer nature so that it does not leave a hard formation on the heated area with which it is in contact. This oil vaporizes at the operating temperature of an air compressor and a good part of it goes off as vapor and the remaining carbon, since it is soft and fluffy, can travel along with the air stream rather than build up detrimental deposits under the valve disks.

*Clark Brothers Co., Inc. Portion of paper given at N.G.A.A. southern regional meeting, Tyler, Tex.

When carbon forms on a valve disk, it is likely to hold the disk open and by so doing can cause the discharge air to recycle back and forth through the valve and consequently a high-temperature will result which will cause any carbon deposit to glow and thus result in the possibility of fire or explosion, if these glowing particles should contact with oil some place in the air-discharge line. Operators, therefore, defeat their purpose by specifying a high-flash oil to be used for air-compressor operation. This theory has been widely advanced and accepted by some, but its utility with regard to the compression of gases which do not support combustion is open to question.

Dry, Sweet Gas

If the gas is dry and sweet, the problem of lubrication is not great since with a low discharge temperature, there is little likelihood of hard deposits forming on the valves and the oil does not require as firm a film between the piston ring and the cylinder wall to seal the pressure across the piston rings. When this condition occurs relatively light-viscosity oils such as S.A.E. 20 or 40 can be used and no additives are necessary. Field practice in cases of this kind is to use the same oil that is used for lubricating the engine crankcase and the power cylinders.

When the ratio of compression is high, the oil is required to have greater sealing powers to prevent leakage across the rings since the piston will be operating with a higher differential pressure between the head end and crank end of the cylinder. The oil in this case must be chosen with a high film strength and with a minimum of carbon residue so that carbon or other gummy materials do not form on the discharge valves. When the cylinder is operating with high ratios of compression, the discharge temperature of the gas is naturally high from the heat of compression and the operating oil viscosity is decreased accordingly, so that an oil of higher viscosity should be used. If a discharge valve should be broken, the temperatures within the cylinder will increase considerably and if the breakage should occur on the crank end of the cylinder, there is a possibility of deposits forming on the piston-rod surface since it is uncooled. This deposit can be cooled at the packing which may show an accumulation of carbon or tar-like material after it has run for a period of time with this condition.

Piston-rod packing rings naturally run somewhat hotter than piston rings within the cylinder since the packing rings are in contact with the rod which is uncooled and the piston rings are in contact with the cylinder walls which are cooled. The packing and rod naturally are heated by piston-rod friction alone without any increase in temperature caused by heat of compression. When a cylinder is operating with bad valves, the extra heat applied to the rod and packing is likely to break down the lubrication on both the cylinder and the rod and permit blowby across the piston and packing rings which further increases the heat to the point where subsequent scoring can be expected.

Greater Ring Pressure

As operating pressure is increased, the pressure behind the piston rings increases, causing a greater ring pressure against the cylinder wall. If the oil is light, so that a film cannot exist between the ring and the cylinder wall, blowby and subsequent scoring will occur. Lubrication of a cylinder operating at pressures less than 100 psi. naturally is much less a problem than the lubrication of a cylinder which operates at 2,000 to 5,000 psi. Distribution of the lubricant over the wall of low-pressure cylinders is taken care of by additional oil feeds. It is advisable to use a relatively light oil on low-pressure cylinders, since the oil film need not have as high strength as for high-pressure cylinders. The light oils also have much less drag than the heavy oils, which is a measurable factor when dealing with large cylinders.

Distribution of the oil over the surface of high-pressure cylinders is not as important a problem as it is in the larger cylinders. The additional drag on the cylinder caused by the heavier oil is not so important since there is a relatively smaller surface to which the heavier oil is applied. It is advisable, as proved by field practice,

TABLE 1—VISCOSITY REDUCTION DUE TO DISSOLVED NATURAL GAS

	S.S.U.		Ratio absolute viscosity at atmospheric pressure to that at 3,000 psig			
Oil sample—	100° F.	210° F.	85° F.	120° F.	154° F.	186° F.
Commercial S.A.E. 30	519	67	11.6	5.1	3.5	2.8
Bright stock	2,975	165		8.7	4.1	3.9
Refined castor oil	1,370	105		2.4	2.0	1.8

Swearingen & Redding, Industrial & Engineering Chemistry, 34, 1496-1498 (1942).

to use a heavier oil if the pressure to which the cylinder operates is increased and if pressures above 2,000 psi. are reached. Viscosity reduction of oil will result when hydrocarbons are compressed under high pressure because the gas tends to go into solution in the lubricating oils, and heavier oils can absorb more than light oils and still keep within a reasonable viscosity range. Table 1 indicates the viscosity reduction for a lubricating oil when saturated with natural gas at high pressures.

The addition of neutral fatty oils to the lubricant for high-pressure cylinders has proven a definite advantage in many field installations. For example, successful lubrication of 5 and 6-in. diameter cylinders operating at discharge pressures up to 4,500 psi. has been attained using oils having viscosities from 160 to 260 S.S.U. at 210° F. Somewhat lighter oils compounded with from 5 to 15 per cent of neutral tallow or lard oil have been used in this type of service.

Large low-pressure cylinders may have one or more oil feeds located at the middle, in, and around the circumference so that it is possible to get good distribution of the oil over the entire cylinder surface. The low-pressure cylinder also has one oil feed to the packing which directs oil to the pressure end of the packing so that proper lubrication to the first few pressure rings is assured.

For higher pressures, the cylinder size naturally becomes less and consequently fewer feeds are required. The oil deposits on the piston rod and the remainder of the packing rings are lubricated with the oil that is spread on the rod. Packing manufacturers agree that most of the sealing is done on the first few rings of the packing. These rings get hotter than the remaining rings and their lubrication requirements are much more acute.

High-pressure packing requires an additional oil feed since there are so many rings that require lubrication and the only way that the oil can be distributed properly over the machined surfaces involved is to have additional oil feeds.

Jacket-water temperature may have an effect on the successful lubrication of a compressor cylinder when the gas that is being pumped is either saturated with moisture or contains heavy hydrocarbons. When the gas is saturated, liquid is likely to condense on the cylinder wall and impair the efficiency of the lubrication of the cylinder. In the case of water-wet gases, the condensate tends to wash the lubricant from the cylinder walls. In the case of wet hydrocarbon gases, the liquid formed tends to thin the oil. By keeping the cylinder jackets at a relatively high temperature, the gas coming in contact with the cylinder wall is less likely to condensate on the wall, and therefore, the problem is not as great as if the cylinder were operating with lower jacket-water temperatures. If the gas contains liquid slugs, liquid formation on the cylinder walls cannot be prevented by increasing the jacket-water temperature on the cylinder walls.

Higher temperatures on cylinder walls tend to decrease the viscosity of the oil and therefore heavier oils should be used as cylinder-wall temperature is increased. When water from wet gases forms on cylinder walls, it is advisable to use an oil that contains properties such that it will emulsify to form a lubricant rather than to be washed off the walls by the water. A water-oil emulsion is preferable to having the oil suspended in drops in a body of water.

Type of Gas Pumped

The type of gas pumped is an important factor in the selection of a lubricant especially if the gas has quantities of hydrogen sulfide or if it bears moisture or hydrocarbon liquids as mentioned. If H_2S is present or any other constituent tends to wash the lubricant from either the cylinder walls or the piston rod, it is necessary to supply oil in sufficient quantities so that the walls will be kept flooded at all times to the point where the gas absorption of the oil does not spoil the lubrication of the wall. Common practice when this type of gas is prevalent is to inject large quantities of light oil such as a mineral seal oil into the cylinder. If this system is not employed, it is necessary to use other means to keep an oil film on the cylinder walls and here again oils with a fatty addition such as rape seed oil, tallow oil, etc., have proved their worth in the proper lubrication of compressor cylinders.

Hydrocarbon gases containing droplets of liquid which tend to coalesce on cylinder walls present much the same problem, and it is necessary to add a substance to the oil to make it adhere to the surface or to use flushing system for keeping sufficient quantities of oil supplied to the cylinder. Inert gases that do not condense or contain liquids introduce no special problem and the same oil may be used for similar lubrication that is used for an air cylinder operating under similar conditions.

Chemically active gases obviously create problems of lubrication, and compressor parts must be made of metals which will resist corrosion by the corrosive gas handled. With some gases, petroleum products cannot be used for a lubricant, as is the case with oxygen, which forms an explosive combination with any petroleum product now known which is cheap enough to use. Chlorine also presents a lubrication problem since it reacts with oil to form gummy sludges and deposits. When lubrication troubles such as sludging of oil and excessive deposits are experienced in the compression of a supposedly inert gas, chemical analysis of the gas and the sludge formed should be made.

Factors to Consider

The factors that must be considered when the machine is operating single stage and multistage are the type of gas pumped, and the pressure at which it is discharged. First-stage cylinders usually offer no problem other than those previously discussed, but with wet gases operating in multistage compression, it is necessary that the gas condensed in the intercooler be drained off so that no liquid enters the higher-pressure cylinders. Liquid entering a cylinder from an intercooler under high pressure has high velocity so that some lubricant is washed off cylinder walls and piston rod from impact alone, in addition to the wiping off that is done by scraping of piston rings over the moisture-wet surface.

Coolers between stages should be equipped with adequate separators and proper drains so that no moisture reaches the cylinder located after the cooler. In this case, the problem of lubrication is solved by the use of proper technique in removing moisture from the cooler rather than by the selection of a proper lubricant. In general, velocities through liquid knockout drums should be well below 1 ft. per second to avoid liquid carryover.

The dirt which is carried along by gas can create a problem in the compressor cylinder that cannot be solved by the selection of a lubricant. A variety of contaminants in solid form are often present and some, such as dust, soot, sand, grit and chemicals, entrain in liquid. Hard particles abrade cylinder surfaces and interfere with ring and valve seating. Some of these contaminants may promote oil oxidation or decomposition. Some particles adhere to oil-wet surfaces and their accumulation results in the building up of deposits on discharge valves in ring packing, and in discharge passages.

Compressor deposits are often referred to as carbon or carbonaceous

(Continued on page 69)

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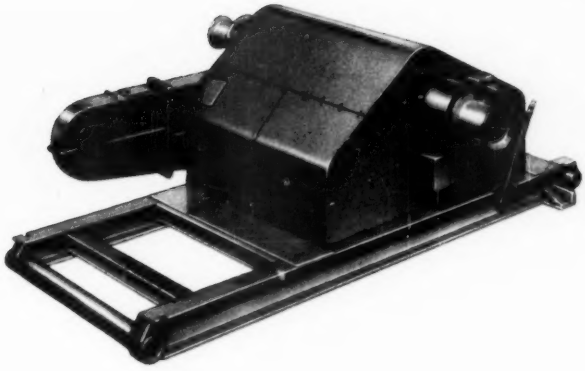

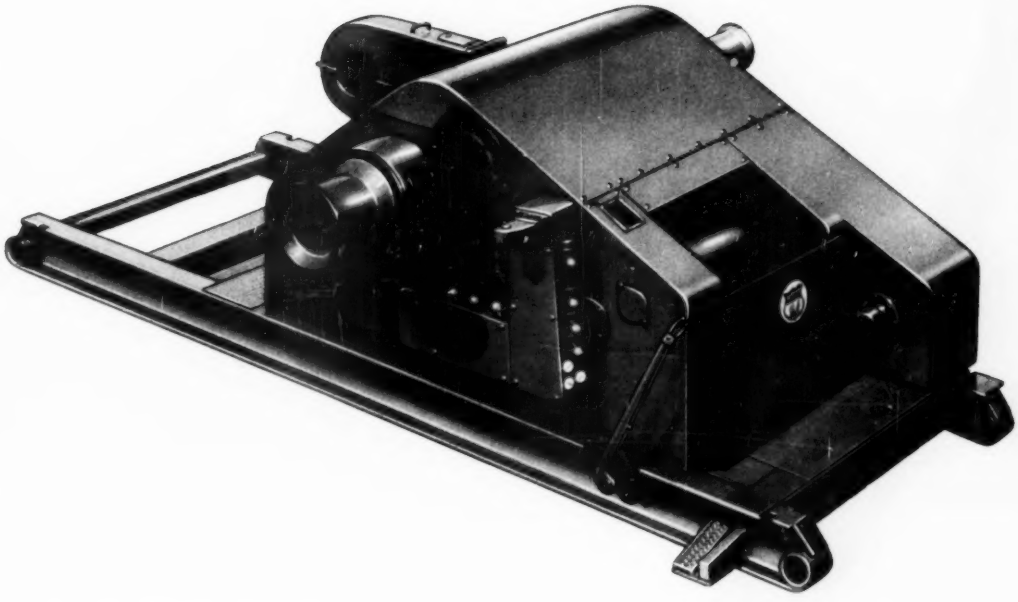

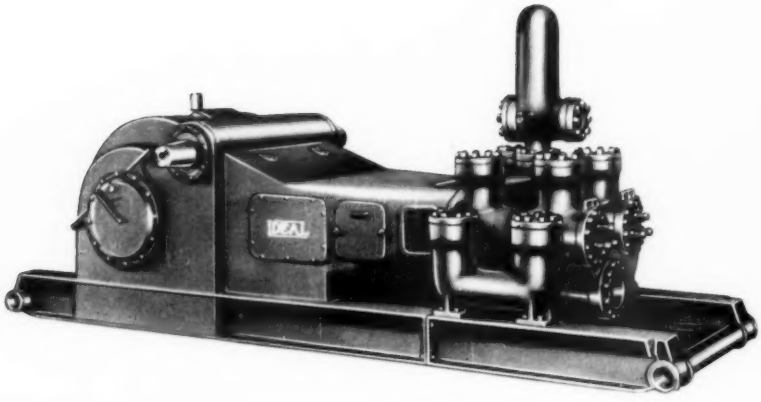

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deposits, but analysis will show that they are often largely composed of contaminants brought in with the suction gas. If the contaminants cannot be removed with suitable gas cleaners on the suction side of the compressor, it is essential to install a flushing system for washing away the particles which may accumulate within the cylinders. This is particularly true when starting a new installation, when rust and scale particles and welding slugs from the lines are a major hazard. Sulfide-rich gases generally form a black dense deposit which looks very much like carbon deposited from lubricating oil.

The proper operation and maintenance of a compressor will solve some of the problems of lubrication. The installation of pressure gages and temperature gages in the suction and discharge lines with a good daily record of the readings on these gages will often indicate trouble arising from mechanical sources which often is the cause of a so-called lubrication problem. The proper maintenance of compressor valves, packing, and piston rings will help to eliminate some of the problems of lubrication. When new piston rings or packing rings are placed in the machine, they should be flooded with oil and given a good breaking-in period before full pressure is applied to the cylinder. When new packing is installed, the piston rod should be well swabbed with oil and the condition of the oil as it reaches the packing should be examined to see if it contains any abrasive material or cast iron or metallic particles from the packing.

During the breaking-in process, fine powder from the packing rings will be prevalent in the oil until the packing rings are fully seated. Pressure should be applied very slowly to the packing and under no circumstance should full pressure be placed on the cylinder, if there is any indication of the powdery, metallic substances prevalent on the piston rod. This is determined by scraping off small quantities of the oil with the finger as it forms on the rod and examining the oil for traces of the metallic powders. If oil is absolutely free of metallic particles, packing is ready to seal against full pressure.

There are many views of how much oil to use in lubricating a compressor cylinder. In the case of a compressor handling dry sweet gas at moderate compression ratios, a safe value is about a pint of oil for each 2,000,000 sq. ft. of surface swept per day. This value should be decreased slightly for large cylinders and increased for small ones. An excellent test for adequate lubrication is to remove a compressor valve and feel the cylinder wall. If it is dry, more oil is needed, but if pools of oil are observed on the bottom of the cylinder or in the discharge passages, the oil quantity may be reduced.

Scurry County's New Reef Fields

(Continued from page 49)

topped the reef at about minus 4,375 ft., some 75 ft. above the estimated water level, but because of tight pay conditions the operator was unable to complete it as a reef producer. It was, however, finaled as a Strawn producer, rating a potential of 110 bbl. daily flowing through a ¼-in. choke, in a limestone pay at 7,643-80 ft.

Formation Characteristics

As was previously stated, best porosity and a higher percentage of net pay are generally found in producers situated well up on the reef mass. In many of these wells, principally in the North Snyder area, 80 per cent or more of a 400 to 700-ft. section has been shown to be productive by Micrologs *(see The Oil and Gas Journal, December 29, 1949, page 35 for explanation on use of these logs)*. A good example of a well with high percentage saturation is shown in the accompanying microlog chart of a high well drilled in the southern part of North Snyder.

For North Snyder as a whole, some engineers anticipate the net producing section will average around 70 per cent of the total reef pay. In contrast, the average saturation of wells in the Kelley area may not exceed 40 or 50 per cent, while in Diamond-M it appears the average net pay is around 55 or 60 per cent. Micrologs of wells in these two areas are given in accompanying illustrations.

Because of limited core-analysis work and the wide variance in porosities and permeabilities, it is difficult to arrive at average figures for the entire area. Porosities vary from vuggy or cavernous to extremely tight, all wells generally encountering some nonporous streaks within the reef at some point or other. In North Snyder, an average porosity of about 16 per cent has been shown on some analyses; in Kelley, porosities are averaging around 14 or 15 per cent. In one North Snyder well, analysis of 250 ft. of reef section showed an average permeability of 17 md. Insofar as interstitial water is concerned, limited work indicates an average content of about 25 per cent.

Bottom-Hole Samples

Production of oil is expected to be accomplished almost solely by solution-gas expansion; little driving energy is anticipated from water as will be brought out later. Reservoir-fluid analyses have shown the crude to be undersaturated, having a solution ratio of about 800 cu. ft. per barrel. For North Snyder field the saturation or bubble-point pressure has been reported as being 1,725 psig. In Diamond-M the saturation pressure was measured to be 1,946 psig. at 130 F. (see accompanying figure). Initial bottom-hole pressure was about 3,100 psi. at the minus 4,250-ft. datum so that pressures can decline some 1,100 psi. before the bubble-point is reached.

Results of a differential liberation of gas from solution of a bottom-hole sample of Diamond-M crude are shown graphically in a chart herewith. As shown the sample yielded 1,052 cu. ft. of gas per barrel of residual oil in reducing the pressure to atmospheric. As a result of the release of the solution gas, 1 bbl. of reservoir oil shrank to 0.622 bbl. of stock tank oil. (See figure.) Separator tests at 40 psi. showed a gas-oil ratio of 914 cu. ft. per barrel and a shrinkage factor of 0.625. Data on viscosity measurement made on the Diamond-M crude sample also are shown here (see figure).

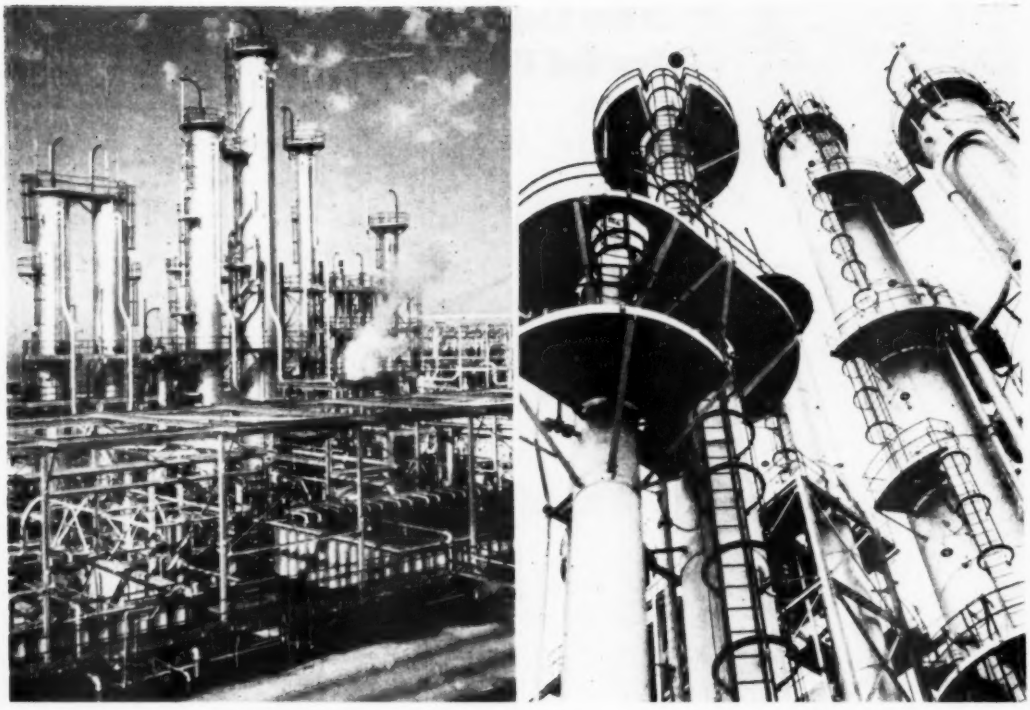
While sufficient production data have not yet been accumulated on the Scurry fields, most engineers now do not anticipate any substantial water drive. The primary reason for this belief is the fact that the reef is surrounded by shale so that any water drive would have to come upward from the relatively thin Strawn section on which the reef is built. The many nonporous stringers encountered throughout the reef are expected to greatly hamper any such drive. Only time will give the correct answer.

Other Pay Formations; Extensions

The aforegoing discussion has dealt only with the Canyon Reef mass which future drilling is expected to prove conclusively to be one continuous reservoir. Along the eastern side of the reef, some Strawn limestone pays also have been developed; likewise deeper Ellenburger production has been established in spots. Productive limits of the Sharon Ridge-North Snyder reef mass appear to be fairly well defined, but recent developments have indicated that the reefing trend may extend on northeast and to the southwest.

Some 8 miles on northeast of northernmost producers in North Snyder field, early in January J. A. Chapman Producing Co. completed a Canyon Reef producer at a subsea depth of about 4,365 ft. This discovery, just over the line in Kent County, opens this new area to reef production whether or not it is a separate pool.

In Borden County, some 4½ miles west of Sharon Ridge, Amerada Petroleum Co. likewise completed a reef producer late in December 1949. This discovery, its 1 Von Roeder, topped the reef at 6,835 ft. (minus 4,467 ft.) and was completed as a flowing well for 185 bbl. daily at 7,100-10 ft. The discovery is thus producing from a zone some 400 ft. lower than Sharon Ridge wells, but it did show a continuance of the reefing trend on west of present Sharon Ridge limits.



Left: Union Oil's toluene plant at Oleum, Calif., which has been put into use as a superfractionation unit without disturbing original design. Right: Group of columns employed to fractionate 400-e.p. gasoline into various fractions

Toluene Plant Converted to Gasoline Stabilization With Little Alteration

CONVERTING a wartime toluene plant to a complete gasoline-stabilization plant has been done by Union Oil Co. of California, at its Oleum, Calif., refinery. A minimum of changes were made in the equipment originally installed, to prepare feed stock for hydroforming and to recover the hydroformate and fractionate the toluene from that material. The plant has a daily capacity of better than 10,000 bbl. of full-range 400°-e.p. gasoline as the charging stock from which butane and lighter fractions are removed while cutting a C. 300°-e.p. gasoline as overhead in one column, with a heavy gasoline as bottoms.

Source of the feed to the stabilization plant may be from any type crude processed in Oleum, waxy San Joaquin Valley crude, or oil from the Coastal areas. The 400°-e.p. gasoline is pumped through various partial product condensers both to heat the charge and to cool the vapors from overhead streams of other columns. In these interchangers and partial condensers, the temperature of the feed has been raised to about 340° F. when it enters the former toluene-unit secondary heart-cut tower, but now functioning as a debutanizer. The column is 8 ft. in diameter and contains 40 bubble trays, and the feed, at 85 psig., enters at either of two points, on tray No. 17, or tray No. 21. The bottom of this column is maintained at a temperature of around 355° F. with the heavy gasoline which is passed through a direct-fired heater for splitting that commodity into desired fractions.

Overhead Not Totally Condensed

Because the function of the debutanizer is to remove butane and lighter hydrocarbons from the full-range 400°-e.p. gasoline charge, the overhead contains a mixture of all hydrocarbons fractionated from the feed. Since the original design of the column did not contemplate pressures above 85 psig., the overhead is not totally condensed in overhead condensers. Therefore, all uncondensed fractions removed from the overhead condensate accumulator drum are handled by auxiliary vapor compressors to obtain the desired liquefaction. Reflux is pumped back to the column from the overhead condenser accumulator drum, to maintain a temperature of 120° F. when the column is operating with a charge of 10,000 bbl. per day (with reflux approximately 3,000 bbl. per day).

The product from the bottom of the debutanizer is transferred directly, under column pressure, to the tower which originally was the azeotropic column in the toluene plant. The tower is 9 ft. in diameter and contains 50 bubble trays, and is operated at 35 psig., with the feed admit-

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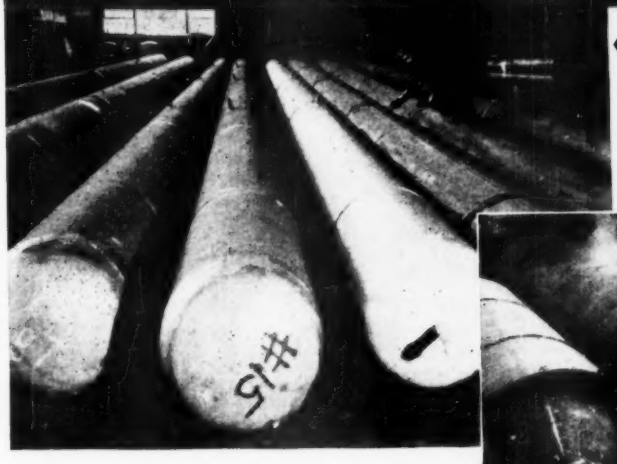

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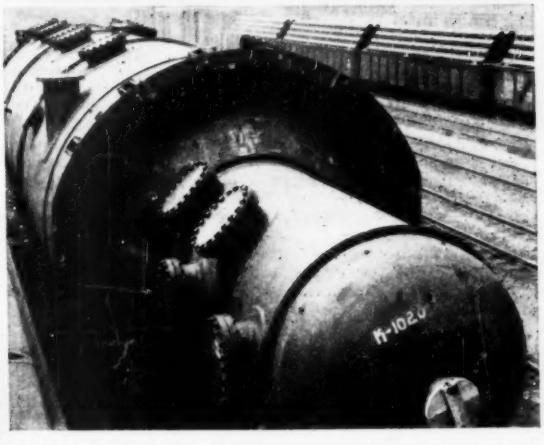

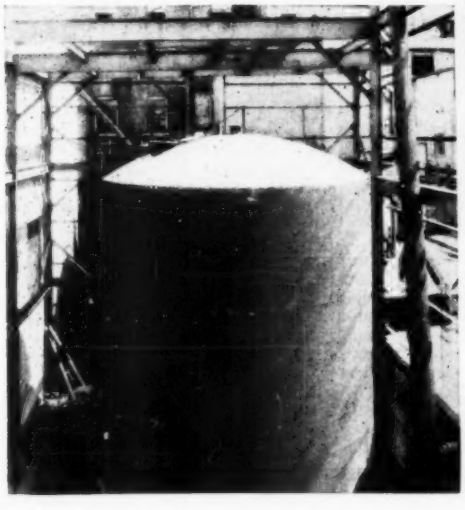

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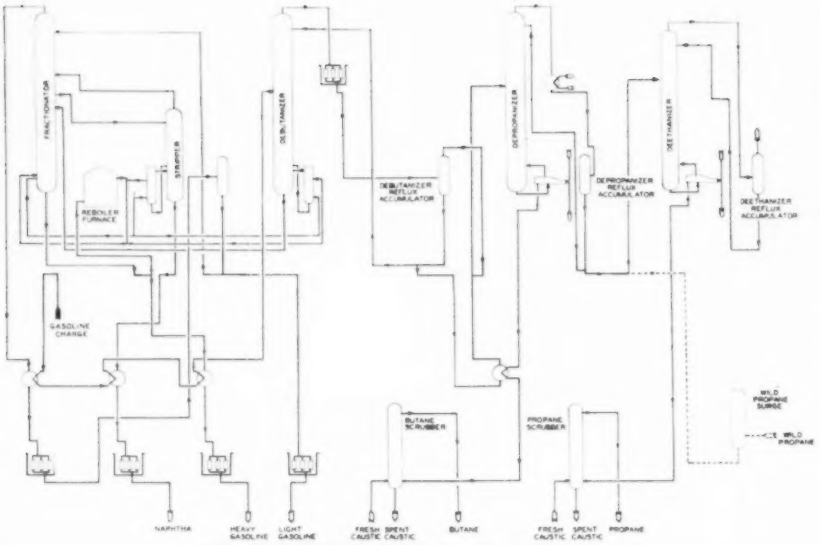


Process flow diagram of light-ends unit at Oleum refinery

ted at one of three points; trays 22, 28, or 40. The bottom product, fractionated into a heavy gasoline, is withdrawn by pumping and directed as a split stream to the direct-fired heater from which this quantity is returned to the base of the column as a source of heat to maintain a bottoms temperature of about 440° F. The volume of liquid bypassed at the heater-transfer line for reboiling the base of the debutanizer is also returned to the fractionator, while excess product from the base of the column is piped to the charge exchanger and final coolers.

The overhead cut from the gasoline stabilizer is a 300°-e.p. product, directed through a partial condenser to relieve the load on the final cooler and impose a lower pressure upon the column. The gasoline fractionator may also be operated to produce a side cut from the tower as a solvent, if desired. Material employed as a charge for the side stripper, where the solvent is fractionated, is part of the bottoms from the gasoline fractionator refluxed with a drawoff pan product taken from plate 23. Reflux from the overhead product condenser accumulator drum is pumped to the top of the fractionator to maintain the desired top temperature with a volume of approximately 4,700 bbl. per day.

Pumped to Depropanizer

The overhead from the debutanizer is pumped to the depropanizer, a column 3 ft. in diameter and containing 40 bubble trays, on either tray 16 or 20 as the case may be. The charge is piped through the depropanizer product bottoms exchanger for a temperature of approximately 185° F. The process required the depropanizer to be operated at about 340 psig. adequately to separate propane and lighter cuts from the butane bottoms. Steam at 150 psig. is used to operate the reboiler on the base of the depropanizer to maintain a temperature of 240° F. on that unit. Butane is withdrawn from the base of the column to flow through the depropanizer feed exchanger and finally cooled in condensers operating on salt water. A packed column is placed in the line through which the finished butane is washed with caustic to remove hydrogen sulfide.

The overhead from the depropanizer is composed of propane and lighter which is pumped to the deethanizer, 2 ft. in diameter and containing 18 bubble-cap trays. The feed enters the deethanizer either on tray 4 or 8, at about 95° F., and is fractionated into ethane and lighter as overhead, and pure propane as a bottom product. The column operates at a pressure of 485 psig. and employs all of the overhead liquid as reflux, which is pumped back to the top of the column. Vapors not condensed are released from the top of the accumulator drum into the plant fuel system.

The direct-fired heater used in this plant to produce heat for reboiling the bottoms of the various towers is designed for a flow through the unit in four parallel streams. The combined volume of the heater streams amounts to 18,300 bbl. per day. The material from the transfer line has a temperature of 510° F. and is partly vaporized under the heater temperature and pressure conditions employed. The transfer line contains three takeoffs through which one stream, approximately 65 per cent of the total quantity passed through the heater, returns directly to the base of the gasoline fractionating column.

The second stream is passed through the shell side of the debutanizer reboiler where all vapors in the heating stream are condensed and only a liquid level is maintained in the reboiler. From this reboiler the material enters a 6-in. line to be returned to the gasoline - fractionating column. The third stream from the furnace transfer-line takes off flows through the reboiler on the side-cut stripper and amounts to about 1,350 bbl. per day in volume. This material joins with the material from the debutanizer reboiler and flows with it to the gasoline fractionator, but enters at a separate nozzle than the main volume in stream No. 1 from the direct fired heater.

Products from the gasoline fractionating unit, the former toluene plant, are as follows:

Product	°A.P.I. gravity	Bbl. daily
Fuel gas		191
Propane	147	373
Butanes	111	612
Light gasoline	63.2	*5,811
Heavy gasoline	45.8	†3,530
Total		10,517

*C$_5$ 300° e.p. †300° -400° e.p.

The products streams are maintained with rigid specifications and are as follows:

Propane—2.5 mol. per cent C$_4$, 1.5 mol per cent iC$_4$ maximum.

Butane—1.0 mol per cent C$_3$, 1.0 mol per cent iC$_4$ maximum.

Light gasoline—1.0 mol per cent nC$_5$ maximum with 255 to 265 at 90 per cent distilled.

The propane is used in various other processes in the plant, such as the Duo-Sol and the dewaxer, and must be free of any contaminants. Frequent inspections of the propane stream reveal that it is a pure product and exceeds the specifications set out above.

The toluene plant, as originally designed and constructed to produce high-purity toluene from the hydroformate, was disturbed as little as practicable when converting to a gasoline fractionator. This was done with the anticipation that toluene might, in the future, be required to manufacture trinitrotoluene and the plant could be reconverted and restored to its original operation with little delay.

ENGINEERING fundamentals

Change in Well Capacity With Permeability

THE flow capacity of a well or well system is dependent upon a number of variables, many of which are indeterminate. A previous discussion dealt with changes in flow capacity by change in well radius, and the discussion cited methods of increasing well radius by fracturing or fissuring.

A change in flow capacity due to permeability change alone can be brought about. The distance over which such changes can be made is small and the volume of formation involved is that immediately around the well bore. Increase of permeability could be due to acidizing processes, or to the removal of fine formation particles in the flow stream. Decreases in permeability are probably more common and might be due to the deposition of gypsum or other mineral cementing materials within the formation, to deposition of asphaltic or paraffin residues, or to the consolidation of a formation by some well-completion technique such as the use of a plastic.

All changes in permeability can be looked upon as a change in resistance, and for the situations being considered as a change in resistance within a series circuit. This can be set up analytically for a radial steady state flow system as follows:

Resistance to flow prior to the change in permeability is proportional to $\frac{\ln R_e/R_w}{k}$. Resistance to flow after the change in permeability is proportional to

$$\frac{\ln R_e/R}{k} + \frac{\ln R/R_w}{k'}.$$

In these expressions k is the permeability of the formation before change and k′ is the permeability to which a portion of the formation is changed. R_e and R_w are the drainage and well radii, and R is the radius of that portion of the formation undergoing change. (See Fig. 1.)

The ratio of flow before and after the change under equal conditions of boundary pressure is, therefore:

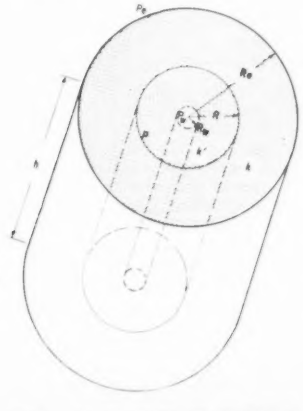
$$\frac{\text{Flow before}}{\text{Flow after}} = \frac{\ln R_e/R_w}{\ln R_e/R + k/k' \ln R/R_w} \quad (1)$$

For given values of drainage radius, well radius, and formation volume affected by the permeability change, the change in flow capacity due to change in permeability can be computed from this equation. Fig. 2 gives a family of such curves for the change in flow in terms of change in permeability over various distances around a 6-in. well bore on approximately 40-acre spacing.

The change in flow due to a decrease in permeability is more marked than that due to increase of permeability. A decrease can always go to zero, but an increase can only go to that limit given by the complete removal of the formation out to the affected radius, R. This latter would be the maximum attainable in an acid treatment assuming the acid completely dissolved the formation penetrated. However, an examination of Fig. 2 shows that flow capacity could be increased to a greater degree by a small increase in permeability over a large radius than by a large increase in permeability over a small area. In an individual instance to achieve maximum increase in flow would require a balance between the penetration which could be achieved and the permeability change that would result. The same is true for achieving a minimum decrease in flow.

The actual increases in permeability due to removal of specific volumes of a formation have not been correlated. Individual experiments which have been performed are too isolated to permit a general correlation.

The decrease in permeability due to deposition of material can be approached by the relative permeability concept if it can be assumed that deposited material would occupy the pore space that would ordinarily be occupied by a wetting fluid. Mineral deposition up to a volume equal to the connate water would consolidate a formation without appreciably lowering the permeability. This variation would depend upon the shape of the relative permeability curve being considered. Deposition of wax, asphalt, or plastic would produce greater decreases in permeability per unit of volume because they would occupy the space configuration normally occupied by a nonwetting fluid.



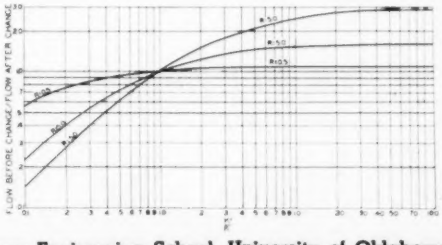


Fig. 1—(Left) Fig. 2—(Right) Change in flow capacity due to change in permeability of radial system shown in Fig. 1 (750-ft. drainage radius and 0.25 ft. well radius.)

Series by Dr. John C. Calhoun, Jr., Chairman, Petroleum Engineering School, University of Oklahoma

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Why Base Thermal Efficiency On Net Heating Value?

What is the excuse for the basing of thermal efficiencies on the net or lower heating value rather than the gross heating value?—R. G. R.

First, the meaning of the terms gross and net heating value must be explained. In determining the amount of heat that can be obtained from a fuel, the fuel and air are brought into the combustion equipment (a burner or a pressure bomb) at some low temperature, preferably 60° F. The heat liberation is measured by cooling the high-temperature gaseous products (flue gas) back to the original temperature of 60° F. The cooling is usually done with a large quantity of water so that the water temperature rises only a few degrees.

The flue gas contains mainly nitrogen, oxygen, carbon dioxide, and water vapor. The water vapor comes almost totally from the hydrogen in the fuel. The percentage of water vapor in the flue gas ranges somewhat as shown in Table 1.

The percentages are even lower when normal percentages of excess air are employed. Amounts of excess air up to 50 per cent are common and hence the moisture content of the flue gases from even the gaseous fuels would be only 11.1 per cent.

As the flue gas is cooled, a temperature is finally attained at which water vapor begins to condense. The amount of water vapor that can be present in a flue gas at various temperatures without condensing is approximately as follows:

Dew point (° F.)	Volume per cent water vapor
60	1.7
100	6.45
110 (fuel oil)	8.5
133 (gaseous fuels)	16.6
163 (hydrogen)	34.6
200	78.0
212	100.0

Thus, most generally, the moisture in normal flue gases does not begin to condense until the low-temperature range of 100-130° F. is attained. Even the flue gas from a pure hydrogen fuel would have to be cooled to 163° F. and lower before the water vapor would begin to condense. Note also that excess air will even further reduce the dew-point temperatures.

TABLE 1

Approximate Water Vapor in Flue Gases (Volume Per Cent) for Theoretically Perfect Combustion at No Excess Air

	Based on Complete gas	Based on On Orsat*
Pure carbon	zero	zero
Petroleum coke	2.57	2.64
Coal, bituminous	6.45	6.9
Fuel oils:		
Heaviest	8.5	9.35
Lightest	10.8	12.1
Butane	12.8	14.7
Gaseous fuel	16.6	20.0
Hydrogen	34.6	52.7

*Since no water vapor is measured in the Orsat analyses, the figures given here are extras based on the Orsat analyses as 100 per cent.

Definitions

The gross or higher heating value is the total amount of heat contained in the flue gases when the gases are cooled to 60° F. and any water vapor contained in them is condensed. The latent heat of condensation is a significant item because it has a numerical value of 1,058 B.t.u. per pound of water if the condensation takes place at 60° F. The heating value ordinarily determined experimentally in the laboratory is the gross heating value.

The net or lower heating value is the same as the gross heating value except that the heat delivered from the gases by the condensation of moisture is subtracted from the gross heating value. Computations involving either the amount of water condensed or the percentage of hydrogen in the fuel are necessary in determining the latent heat of condensation of the moisture.

Argument.—The main reason for the use of the net heating value as a basis for computing the thermal efficiency of a boiler or furnace is evident from the above discussion. The recovery of the latent heat of condensation of moisture from the flue gases is ordinarily impossible because the flue gases are not cooled to the dew points of 150° F. or lower as indicated above. Furthermore, the condensation of moisture would be a bad practice because moisture would rust steel stacks, spoil the foundations and mortar of chimneys, and if sulfur dioxide (or trioxide) were present, severe corrosion could occur. Finally, computations are simpler when the net heating value is employed because specific heats are a smoothly varying factor throughout the entire temperature range whereas latent heat begins suddenly to enter into the heat recovery at the dew point, thus creating a somewhat discontinuous relationship between flue gas temperature and heat recovered.

For ordinary furnace installations in which the stack-gas temperature exceeds 150° F., the true and basic measure of attainment of efficiency is the net heating value.

Arguments for Gross Heating Value

There are, however, powerful arguments for the use of the gross heating value in computing efficiencies. Several of these arguments are:

1. Fuels are ordinarily purchased on a basis of gross heating value. Thus, if management wants to know how much of their purchase is being recovered, they prefer the gross heating value as the basis of thermal efficiency. The answer to this is that the net heating value is a better and truer basis for the purchase of fuels than the gross heating value. With regard to coal or coke, either basis is satisfactory because there is little difference in the two heating values, but for certain gases that are rich in hydrogen, the net heating value is far lower than the gross heating value.

2. The gross heating value is obtained directly from laboratory experiments whereas the net heating value is a computed figure which either necessitates an estimate by an experienced combustion engineer, or the conducting of elaborate laboratary experiments to determine the hydrogen content of the fuel. Gases are somewhat an exception because their net heating value can be had nearly directly by measuring the liquid water condensed during the determination of heating value in the laboratory.

3. Fundamentally, the gross heating value is a broader and more fundamental concept. It can be used down to a temperature of 32° F. (where water freezes) and hence it can be used to compare a high stack-temperature process with a low-temperature one in which condensation of moisture occurs.

Perhaps the best that can be done until some society or agency provides a standard method of computing thermal efficiency, is to compare the efficiencies obtained from the net and from the gross heating value. This will be done in next week's issue of Questions on Technology under the title: "Efficiency Based on Gross and Net Heating Values."

The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Measuring Floating-Roof Tanks

TANKS installed with floating roofs, either single or double seal, effect considerable economies with regard to vapor loss through elimination of the vapor space over the liquid being stored. Filling losses are done away with and practically all standing loss is eliminated. Since evaporation in gasoline storage is apt to be the source of large losses in the refinery, floating roofs may be considered economical for gasoline tanks which are worked once every 2 months or oftener, as well as for blending tanks. They also may be economically justified for some crude-oil tanks filled with a frequency of as little as once every month.

The use of floating-roof tankage is therefore widespread and existing installations include pan, pontoon (high and low-deck) and double-deck roofs. Although pan roofs are increasingly less favored for future installation, they may still be specified with advantage for certain services. Special consideration, however, must be given to this type of roof in particular and to pontoon roofs in a lesser degree when it comes to gaging and preparation of volume gage tables. Floating-roof tanks ordinarily are gaged by means of the regular innage gage tape, an automatic float operating in the gage hatch, or a "surface tension" disk float. These are methods common for cone-roof tanks, but comparable accuracy may be difficult to obtain with pan and pontoon roofs.

The ordinary innage measurement with hand tape through gage hatch, Fig. 1 (A), is possibly the most common method and sometimes recommended as the best procedure. Volume of liquid in the tank is read from the volume gage table prepared as for a cone-roof tank and volume displaced by roof is calculated and subtracted. For greatest accuracy in calculating roof displacement, a sample of liquid is taken from just below the roof and its gravity determined, with correction for temperature. Alternatively an average gravity may be assumed for the liquid in the tank.

This method of gaging may be open to error since it assumes the roof to be floating freely on the liquid without consideration for effect of friction of shoes against the tank shell. Extent of friction may vary as among different installations and at different levels in the same installation as the roof moves up and down the tank. Type of product stored introduces another variable since more friction will be encountered with gasoline than crude oil, due to the greater lubricating effect of the latter. Friction occurring to the extent that the roof cannot be assumed to float freely nor its weight assumed constant for accurate measurement purposes, results in errors that may become additive over a number of gages.

Outage gaging wherein the roof itself is used as the float is shown in Fig. 1 (B). This has a number of advantages, chief of which is that the gage can be read to actual liquid level, and error due to variation of liquid gravity under the roof is eliminated. However, to be accurate the roof must be level and constant in shape at different levels up or down the tank. This is sometimes not the case, particularly for pan-type roofs, which may not only be tilted sufficiently to introduce significant errors in gaging but may also be distorted relative to the point to which the gage tape is fixed.

Roof distortion can introduce errors, as well, in the case where gaging is done with two measurements as in Fig. 1 (C). Such errors can more than nullify the correction obtained by this method for variation in volume of liquid in the seal ring annulus.

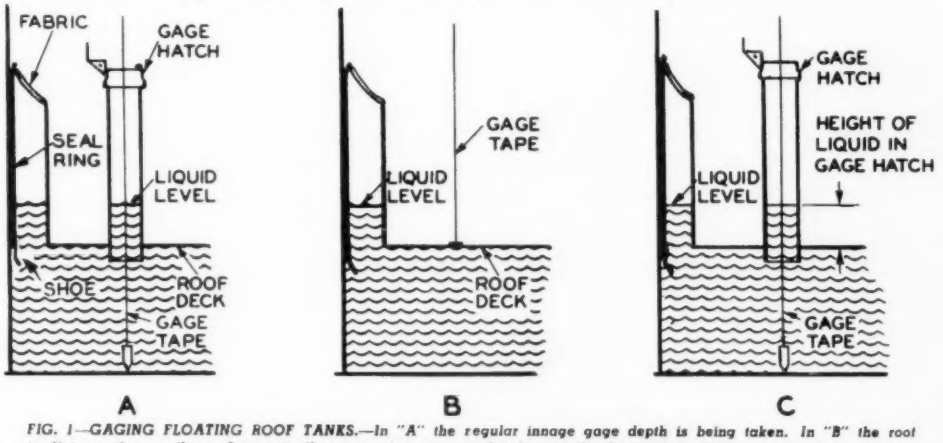


FIG. 1—GAGING FLOATING ROOF TANKS.—In "A" the regular innage gage depth is being taken. In "B" the roof itself is used as a float. Automatic float operating in gage hatch may also be used. In "C" gaging is done with two measurements. Regular innage gage depth and height of liquid in gage hatch are obtained.

No. 5 in current series of The Refiner's Notebook

PENNSYLVANIAN SAND IN VELMA FIELD STEPHENS COUNTY, OKLAHOMA

Mud (Aquagel)
R_m = 0.85 ohm at BHT
Bit size: 9"
Spacings: AM = 16"
AM' = 64"
AO = 24'

LOG ANALYSIS

1) Water saturation S

Since R_o is unknown, the method described in "Electric Log Analysis in the Rocky Mountains" by M. P. Tixier, Oil & Gas Journal, June 23, 1949, will be used. Reprints are available from Schlumberger.

The 16" Normal gives 60 ohms. The 24' Lateral gives 160 ohms. With proper correction, from the 16" Normal we obtain R_i = 85 ohms, and from the 24' Lateral, R_t = 102 ohms.

Thus, $\frac{R_i}{R_t} = \frac{85}{102} = 0.83$

SP = –90 mv.
The chart below gives S = 14%

2) Formation water resistivity R_w

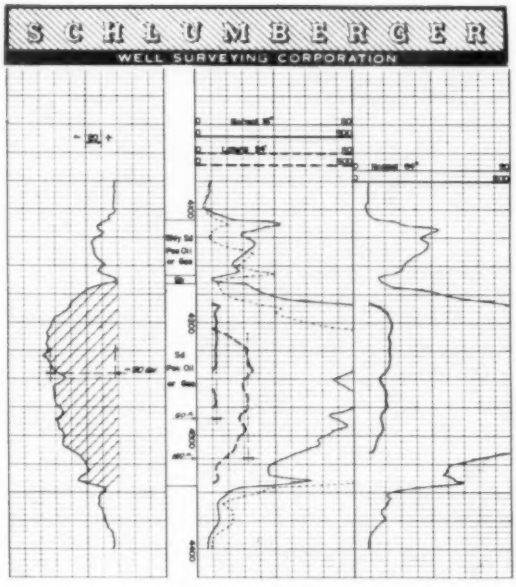
For SP = –90 $\log_{10} \frac{R_m}{R_w}$ = –90 mv.

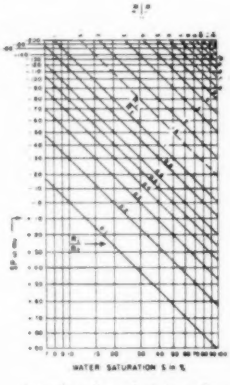
$R_w = \frac{0.85}{10} = 0.085$ ohmmeter

3) Porosity p

$R_t = \frac{F \times R_w}{S^2}$, thus $F = \frac{102 \times 0.14^2}{0.085} = 23.5$

$p = \sqrt{\frac{1}{F}} = 20\%$ approximately m = 2





Procedure for calculation of per cent of water saturation (S).

CORE ANALYSIS

Average Porosity	19%
Average Permeability	108 md.
Connate Water by restored state methods	12%

PRODUCTION RESULTS

From North Offset Well (4200-4360)

Swabbed 1228 BO/21 hours
Pumped 151 BO/24 hours 28.5° API
Gas Oil ratio 139/1

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WELL SURVEYING CORP.
HOUSTON, TEXAS

OIL AND GAS EQUIPMENT Digest

IT'S NEW — CHECK IT

TRADE LITERATURE

1 AUTOMATIC COMPENSATION. a new illustrated bulletin explains how automatic compensation for pressure or temperature variations, or for both, is achieved in flow measurement of gases, liquids, or other fluids, with Hagan compensated ring-balance meters. *Hagan Corp.*

2 ROTARY DRILLING HOSE is a new six-page catalog section on the company's lines of rotary-drilling hose. The section describes in detail the construction materials and methods used in building the hose. Specifications are given, and cutdown sections of the various types of hose are illustrated. Couplings used also are described and pictured. *B. F. Goodrich Co.*

3 HYDRO-PNEUMATIC PRESSURE SYSTEMS. A complete explanation of how to select the proper equipment for hydropneumatic pressure systems, and a detailed and thorough summary of the interrelationship required of the components for such systems have been compiled in a 30-page bulletin. *Peerless Pump Division of the Food Machinery & Chemical Corp.*

4 MODEL-C PORTABLE POWER UNITS. The bulletin is filled with useful information contributed by users of the pipe-bending machine. Also highlights the versatility of the Model-C when it is applied to operations unrelated to pipe threading. *Beaver Pipe Tools, Inc.*

5 CATALOG NO. 50 illustrates and describes over 500 different types and sizes of ball-bearing swivel joints. There are seven basic types for temperatures and pressures from —25° to 600° F. and from vacuum to 15,000 psi. In addition there is a description of all-steel rotary hose, all-metal marine and barge hose, all-steel cementing and circulating hose, circulating heads and mud guns. *Chiksan Co.*

6 ENGINEERED MACHINE COMPUTATION. This interesting 12-page, 2-color, illustrated booklet describes the engineering-computing service, Telecomputing, and the newly developed specialized equipment. The booklet includes history and engineering staff, service procedure and applications, and the development and manufacture of automatic graph readers, electronic graph recorders, and novel vibration frequency pick-up. *Telecomputing Corp.*

7 LEAK DETECTOR BULLETIN. A new 16-page, 2-color catalog has a large section devoted to applications and leak-detection methods used in both vacuum and pressure systems. Examples of both probe and envelope techniques are discussed and accompanying schematic diagrams show the testing equipment necessary. *Consolidated Engineering Corp.*

8 PIPING PRODUCTS. Sixty-five pages of technical data for engineers on welded piping systems, are part of a new catalog listing the com-

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pany's line of welding fittings. The catalog contains charts, tables, graphs, condensations, and discussion of pipe specifications, welding data, design formulas, metallurgical information, and other engineering data. *Midwest Piping & Supply Co., Inc.*

9 ELECTROFLUID DRIVES are featured in a new 28-page catalog and engineering data book No. 2385. Electrofluid drive, "ED" type, is a compact, packaged power transmission unit providing for smooth, cushioned starting of machines, smooth, running under varying conditions of loading, and automatic overload protection. *Link-Belt Co.*

10 ADJUSTABLE SPEED. A 24-page, 2-color booklet, presents a concise summary of the specific benefits which industry can expect from properly applied adjustable speed. It provides a convenient check list of points to consider in selecting an adjustable-speed drive and gives a clear picture of various packaged units, their range of applications, and performance features. *General Electric Co.*

11 BULLETIN NO. 5218C. Sixty-eight high-speed diesels for automotive, industrial, and marine applications, covering the power range from 50 to 550 hp., and three medium-speed diesels, are described in a new 36-page condensed catalog. Comparative charts, listing the major specifications for each engine, are included to assist in preliminary selection. *Cummins Engine Co., Inc.*

12 DIESEL ENGINES. Diesel engines for stationary installations are described and illustrated in a new 20-page bulletin, No. 4812. The bulletin features 60 years of engine research and production development, and numerous installations. Included are more than 100 engine specifications showing a range in power from the naturally aspirated, 6-cylinder, 175-hp. engine with 8½ by 10½-in. bore and stroke, to a supercharged, 8-cylinder, 1,500-hp. engine with 14½ by 20-in. bore and stroke. *Superior Engine Division, National Supply Co.*

13 HEAT LOSS DATA BULLETIN provides data tables for computing heat loss and figuring heat requirements that are useful to the maintenance or heating engineer whose job it is to figure heat loads and fuel consumption. *Thermobloc Division, Prat-Daniel Corp.*

14 O-C-T "JE" FLOW CONTROL UNIT is a new 16-page illustrated booklet giving complete engineering specifications. In addition to describing the O-C-T "JE" flow control unit in detail, the booklet also gives weight and price comparisons with conventional wings. *Oil Center Tool Co.*

15 STATIONARY OIL ENGINES, a 12-page brochure, describes and illustrates a line of engines, generators, clutches, and coring reels offered by a British manufacturer. The book features adaptability, operating costs, and advantages, and carries a complete list of branches and distributors. *A. E. C., Ltd.*

16 PLUSFEATURE GAS-LIFT VALVES describes a new flow valve assembly for introducing either air or gas under pressure into the oil column. It is a straight automatic differential valve. *Spartan Gas Lift Equipment Co.*

17 DATA SHEETS set forth in chart form the specifications and respective solubility in oils, solvents, and waxes of various molecular weight, polyethylene glycol mono and distearates, laurates, and oleates, and also various glycerol and glycol esters of fatty acids. *W. C. Hardesty Co., Inc.*

18 ALCOA INDUSTRIAL ROOFING AND SIDING is a set of engineering data sheets, including weight and coverage tables, recommended applications, accessories, installation, and diagrammatic sketches of fasteners, flashing, and sections of material. *Aluminum Co. of America.*

19 SYNCHRONOUS-MOTOR-DRIVEN COMPRESSORS describes models in sizes from 300 to 3,000 hp. This well-prepared, multicolor, 64-page book devotes several pages to applications of these units in the petroleum industry. The effective presentation of cross-sectional illustrations is particularly valuable in evaluating the design. *Ingersoll-Rand.*

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OIL AND GAS EQUIPMENT Digest

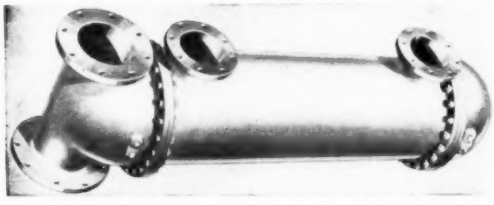
IT'S NEW ✓ CHECK IT

by Dan B. Miller

20 VIBRO MAGNETIC INSPECTION UNIT enables the drilling crew to make accurate inspection, either on location or in shops, of subs, drill collars, tool joints, equipment, and tools, as well as engine parts. The unit is available for either a.c. or d.c. 110-volt current. It weighs 75 lb. and is mounted on rubber-tired wheels. No technical training is required to make uniform, accurate inspections. Portability and low cost made possible because article being tested is vibrated in the magnetic field, thereby requiring a smaller magneto motive force to obtain the necessary intensity of magnetization. *Sonoflux Corp.*

IT'S NEW ✓ CHECK IT

21 TYPE "R" REMOVABLE BUNDLE HEAT EXCHANGERS are of corrosion-resistant admiralty metal tubing. Larger tube sizes (⅜ to ⅝-in. outside diameter) plus engineered tube spacing and baffling provide longer unit life, easier maintenance, and maximum heat-transfer efficiency. The line consists of both single and two-pass models in a wide range of capacities. These units have been especially designed for engine cooling, oil cooling, and miscellaneous fluid cooling. *Young Radiator Co.*



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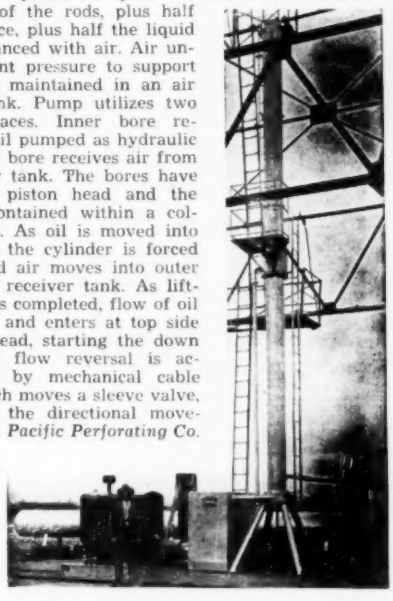
22 MODEL "400" SMITH HYDRAULIC AIR BALANCE PUMPING JACK is a surface fluid motor type that completes its cycle with air balance on one side. Load of the rods, plus half the resistance, plus half the liquid load, is balanced with air. Air under sufficient pressure to support this load is maintained in an air receiver tank. Pump utilizes two annular spaces. Inner bore receives the oil pumped as hydraulic fluid. Outer bore receives air from air receiver tank. The bores have a common piston head and the whole is contained within a column sleeve. As oil is moved into inner bore, the cylinder is forced upward and air moves into outer space from receiver tank. As lifting stroke is completed, flow of oil is reversed and enters at top side of piston head, starting the down stroke. Oil flow reversal is accomplished by mechanical cable device which moves a sleeve valve, controlling the directional movement of oil. *Pacific Perforating Co.*



IT'S NEW ✓ CHECK IT

23 MUD-PIT FLANGES. Designed for use on steel mud pits, mud-pit flanges permit a piece of plain-end pipe to be used as mud line between tanks. Providing a flexible connection, the flanges eliminate necessity of couplings and unions and permit tanks to be placed at any convenient distance apart and as

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much as 15° out of alignment. Flange is made in two pieces. A steel face with a female threaded neck welds to the outside of the tank. The rubber sealing sleeve, self-sealing against water, mud, or oil, makes up into the threaded section of the steel neck. *Owen Tool Co.*

IT'S NEW CHECK IT

24 SAFETY-FLAME HEATER. This heater, designed for use on drilling rigs, is available in models that furnish warmth up to 100,000 B.t.u. per hour using natural, butane, or propane gases, or fuel oil. An outstanding safety feature is that the flame is sealed and protected by flame arrestors. These heaters are ruggedly constructed, weigh 650 lb., and are designed to fit along one side and extending the entire length of the dog house. The 12-ft. stack is hinged to fold down on top of the dog house when moving. *Thompson Co.*

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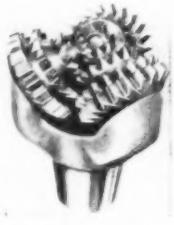

25 TYPE EH THREE-CONE ROCK BIT is designed for use in harder rock formations; dolomite, granite, chert, quartz, and dense sharp sands. Closely spaced teeth insure smooth rotation with maximum chipping action. Reinforced gage teeth maintain true-diameter full-gage hole, and sturdy rolling bearings provide the necessary support for the heavy weights required to drill harder formations. Cones are set at proper angle for most effective rolling and crushing action, with a minimum of sliding, permitting longer hours before the bit dulls. *Chicago Pneumatic Tool Co.*

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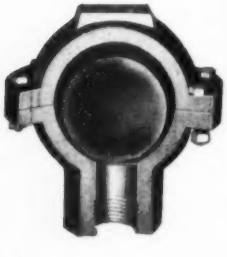
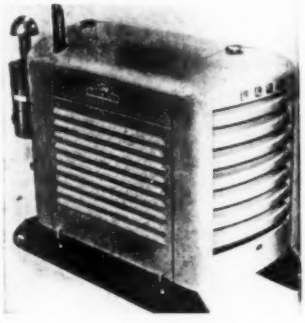


26 PIPE-LINE SHOCK ABSORBER. A complete line of compact liquid shock absorbers designed to eliminate shock and hammering in pipe lines and liquid systems reduces hammering, leaky joints, opened pipe seams, and excess pressure on valve packings to the absolute minimum when such damage is caused by the quick closing of valves or any action that suddenly stops the flow of liquid through a pump or other apparatus. Three of the five models, designated as the industrial, dual, and super, are adapted for general industrial use, chemical, and petroleum plants. There are no moving metal parts. A rubber cushion, encased in a spherical metal chamber, absorbs the shock. This cushion pulsates constantly according to the increase or decrease of pressure in the system. Can be installed in any position. *R-S Products Corp.*

IT'S NEW CHECK IT



27 INDUSTRIAL POWER UNITS. Five models are included in the line and are available in either open or enclosed versions. They will be offered complete with radiator, instrument panel, and S.A.E. or Ford-type housings, and will be equipped with skid-type mountings. The unit may be ordered with or without clutch; power takeoff; and three, four, or five-speed transmissions. Each unit, either open or closed, will be thoroughly tested in manufacturing and will be ready to run immediately upon installation. Line includes two six-cylinder models, two V-type eight-cylinder models, and one of four cylinders. Piston displacement of the four-cylinder unit is 120 cu. in.; 226 and 254 cu. in. in the six-cylinder models, and 239 and 337 cu. in. in the eight-cylinder models. *Ford Motor Co.*

IT'S NEW CHECK IT

28 SINGLE-SEGMENT AND DOUBLE-SEGMENT RINGS AND EXPANDERS are for use on pumps and compressors. Shown here is double-segment type with short section illustrating end of expander fitted into socket. Advantages include: more uniform pressure to each segment, less fatigue to expanders, more uniform wear on segments, practical to use with metal segments, and less danger of expanders fouling ring and cylinder. Rings can be furnished in bakelite, bronze, iron, or other metals. A special method of fitting a stainless-steel spring wire into the sockets or grooves in the segments makes possible uniform pressure to each expander. This uniform pressure in turn adds longer life. It also insures higher efficiency. *L. K. Pump Valve Co.*

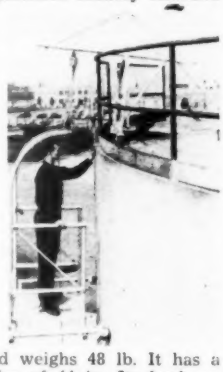
IT'S NEW CHECK IT

29 POLYKEN CORROSION PROTECTION COATING yields substantial savings in labor and equipment for pipe-coating operations, because it gives complete protection in a single operation, requiring no heat or flame, no solvents or greases. Polyken is an oriented polyethylene film with a synthetic adhesive applied to one side; polyethylene plastic has remarkable electrical and chemical-resistance properties. An exclusive "cal-

ender orienting" process gives elasticity and much greater strength than unoriented, melt-extruded forms of polyethylene. Because of its elasticity, Polyken maintains a permanent pressure around the pipe equal to the tension used in applying it, preventing flow of moisture between the tape and the protected metal. *Bauer & Black.*

IT'S NEW CHECK IT

30 ROLL-AROUND AND SAFETY CAGE. Operator can now stand on a safe platform entirely enclosed by a guard rail, his safety belt fastened to the rear guard rail, with area in front and to both sides clear so that he can work freely. The new improved Roll-Around is fastened by a cable to the center of the tank, and the cage is suspended by a block-and-tackle from any one of several attaching positions giving an overhang distance of 18, 24, 30, 36, or 40 in. Construction permits its clearing all obstacles on the top of the tank. Suspension of the safety cage permits clearing obstacles on the sides of the tank. Safety cage weighs 70 lb.; the Roll-Around weighs 48 lb. It has a vertical clearance over obstacles of 44 in. Its load capacity is 1,000 lb. with a factor of safety of 4. *Up-Right Scaffolds.*

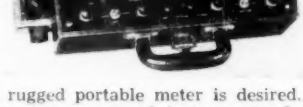


IT'S NEW CHECK IT

31 SPINNING-LINE SWIVEL. Featuring a patented chain retainer that permits replacing spinning chains without cold shuts or missing links, spinning-line swivels are available in seven models to provide for any combination of chain, wire line, and manila rope. All parts of the swivels are of forged steel and are assembled without threads in any part. Ball bearings in the connectors are permanently grease-packed and sealed. Design of the swivel permits straight pull from catline to either spinning chain or tong line. *Otis Equipment Co.*

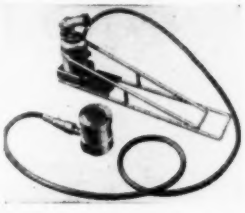
IT'S NEW CHECK IT

32 MULTI-COMBINATION METER. A new, small model designed specifically for electrolysis and corrosion investigations and cathodic-protection testing in both field and laboratory, provides instrumentation to cover a wide range of direct-current potential and current measurements. It is designed for use where a light weight, compact, and rugged portable meter is desired. Available with either of two sets of instruments. In Model B-1 the low-resistance voltmeter is 1,000 ohms per volt, and the high-resistance voltmeter is 20,000 ohms per volt. In Model B-2, the low-resistance voltmeter is 5,000 ohms per volt, and the high-resistance voltmeter is 62,500 ohms per volt. This model is highly versatile and provides for measurement of practically all corrosion and cathodic-protection testing and greatly reduces the time required for field and laboratory testing. *M. C. Miller.*



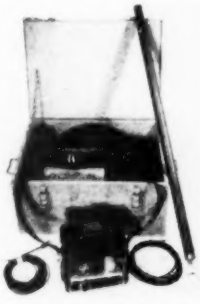
IT'S NEW CHECK IT

33 LO-HITE HYDRAULIC JACK, a compact, easily portable tool designed for lifting jobs in close quarters, can be used for setting boilers, tightening belts, setting engines and slush pumps, setting compressors, diesels and gas engines, lifting and lowering pipe and large valves into place, and similar rigging-up operations. It is fitted with an independent pump, connected to the jacking mechanism by a length of rubber tubing. The pump can be operated from the ground or from any convenient plane, while the jack itself is spotted in close, confined positions, otherwise impossible of access. Oil is sealed-in, completely isolated from the jack exterior, thus permitting use in both vertical and horizontal positions. *Duff-Norton Manufacturing Co.*



IT'S NEW CHECK IT

34 MEDCO ELECTRONIC HOLIDAY DETECTOR. This detector comes in an all plastic case 7 by 7 by 9 in. and weighs 17 lb. It is fitted with a shoulder strap for carrying while in use. Principal features of this detector are that in being carried it does not travel on the pipe, and no holidays can be created by rollers passing over seams or welds. An insulated handle with fitting is used to move the spring electrode along the pipe. Unit has a variable voltage control ranging from 6,000 to 18,000 volts, ample to care for pipe of 30 in. or more. Unit is equipped with both flasher lights and buzzer as warning devices. A 20-ft. trailing ground wire is used and sufficient high-voltage cable from the unit to the pusher handle to provide easy operation. *Midwest Pipeline Service Co.*



IT'S NEW CHECK IT

35 PEN-A-TRATE. A fast-acting, lubricant-base penetrating oil with super capillary action for positive penetration of rusted or frozen metal parts contains no kerosine. The penetrant may be sprayed or dripped over the parts to be loosened. Parts may also be dipped or soaked. Pen-a-trate utilizes the capillary action of fine lubricant to reach the innermost points. The fast-acting penetrant applied to threads or bushings before assembly assures a smooth, snug entry, faster run-on and tight fit while guarding against rust and corrosion. *Ensign Products Co.*

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The demand of management for stepped-up efficiency as an antidote to inflated taxes and high costs leads logically to GASO PUMPS. Here is why: Gaso has concentrated on oil industry needs for more than 33 years. Gaso makes models to fit your conditions exactly. Gaso engineering keeps abreast of every development that adds to performance. Gaso follows through with immediate parts service covering every standard model in operation. It is performance and performance alone that makes GASO PUMPS the standard equipment of so many companies. Write for catalog.

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Among the
Drilling Contractors

Calvert Reorganizes Drilling Corporation

Reorganization of Calvert & Willis, Inc., drilling contracting and producing corporation with headquarters at Olney, Ill., as Calvert Drilling, Inc., has been announced by F. Allen Calvert, Jr., one of the original partners.

The reorganization follows the recent acquisition by Calvert of the stock of his partners, Walter and Audra Willis, in the former corporation. In the reorganization, A. J. Magness, toolpusher and production superintendent in the old corporation, becomes a stockholder and general manager of field operations in the new organization. James B. Redman is secretary and treasurer.

The corporation, operating as Calvert & Willis, Inc., has drilled more than 330 wells in the tri-state area of Illinois, Indiana and western Kentucky during the past 4 years. The new corporation currently is operating four rotary rigs, one for itself and Walter Duncan in Hamilton County, Illinois; another for Kingwood Oil Co. in the same county; the third for Davis & Johnson in Wayne County, Illinois; and the fourth for The Texas Co. in Richland County, Illinois.

Imperial Lets Contracts For 11 Wells at Redwater

Imperial Oil, Ltd., has awarded drilling contracts for 11 additional wells in the Redwater field, 35 miles northeast of Edmonton, Alta., Canada. Five contracts went to Commonwealth Drilling Co., 3 to T. T. Eason Drilling Co., 2 to Parker Drilling Co., and 1 to Canada West Drilling Co.

Jones & Simpson Move

Jones & Simpson Drilling Co., formerly located at Paris, Ill., has moved its operating headquarters to Mattoon, Ill. Jake Wegestaff is general superintendent.

Clark Drilling Co., Billings, Mont., has undertaken a 10,500-ft. Lakota sand test for Bay Petroleum Co. and Superior Oil Co. in the Wallace Creek area, Natrona County, Wyoming. Location is for 1 Unit, 15-34n-87w.

ROTARY RIGS IN OPERATION*

(United States and Western Canada)

Area	Week ended 1-23-50	Change week ended 1-16-50	Change week ended 1-24-49
Gulf Coast	502	—13	— 73
W. Tex.-N. M.	707	— 2	+ 160
Ark.-N. La.-E. Tex.	141	+ 1	— 35
Oklahoma	226	— 8	— 7
Kansas	106	— 1	— 13
Illinois-Eastern	59	+ 5	— 28
Rocky Mountains	70	0	— 53
Pacific Coast	136	+ 8	— 44
Total United States	1,947	— 10	— 93
Western Canada	72	0	+ 16
Total	2,019	— 10	— 77

*Courtesy Hughes Tool Co.

Contracts Let to Redrill Damaged Long Beach Wells

Contracts for redrilling wells in the Terminal Island area of Long Beach which were damaged by earthquakes last November 17 have been let by the Long Beach Board of Harbor Commissioners to Pike Drilling Co., Victory Oil Co., Camay Drilling Co., and International Drilling Co.

Present plans call for redrilling approximately 135 wells. The above contractors are expected to keep six rigs working continuously until this redrilling program is completed. At an expected average rate of about seven recompletions per week, the work will extend over a period of about 20 months.

Engineering surveys have indicated that most of the damage to the wells occurred below a depth of 1,700 ft. and resulted from the shearing action in strata at 1,600-1,700 ft. Wells involved in the present redrilling contracts are those which already have gone off production as a result of the damage. An additional 30 to 35 wells were damaged but as yet have not gone entirely off production. These are expected to require redrilling later, and contracts for this work will be let as occasion arises.

Contracts for the drilling of two new wells in the area were awarded Camay Drilling Co.

Carter-Jones Drilling Co., Kilgore, has moved in to drill a 4,500-ft. sub-Clarksville and Coker sand test for T. W. Everett and associates at 1 Hicks in the Como field, Hopkins County, East Texas.

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BESTOLIFE—the Lead Seal Joint Compound used successfully in the Drilling and Refining Industries for years — is immediately available through more than 100 distributors in the U.S.A. Your nearest supply house field store probably has 'BESTOLIFE in stock for immediate delivery. Use 'BESTOLIFE — It's BETTER!

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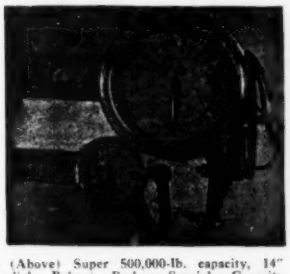
LINE SCALES



(Above) Super 500,000-lb. capacity, 14" dial. (Below) Packer Special. Capacity 40,000 lbs., 6" dial. 18 other models for every drilling, well servicing, or work-over need.

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With a LINE SCALE you know the pull on the line, and the weight on the bit in pounds. Repeated tests prove the accuracy and dependability of LINE SCALE readings under all working conditions . . . even in areas of rapid temperature changes.

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Box 4245 **Oklahoma City** Ph. 6-1765
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If galled threads cost you money, use Reed Super Shrink-Grip Tool Joints! Pre-lubrication infused into the threads prevents galling

If a tool joint is damaged by careless handling, you save transportation costs. Instead of having to pay for sending the length of pipe to a shop, you simply replace the damaged joint *right at the rig!*

If drill pipe is bent or crushed, you don't lose your tool joints. Instead of buying new pipe *with* tool joints, you simply buy the drill pipe and transfer your Reed Super Shrink-Grip Tool Joints to the new pipe at the rig.

If tool joints are worn and pipe is still good, you can save the transportation costs of "shopping" your drill string for tool joint repair or replacement. Reed Super Shrink-Grip Tool Joints are easily replaced *at the rig!*

If you reverse ends of your drill pipe when you change tool joints, you increase pipe life by distributing slip wear to both ends of the pipe. This greatly reduces drill string costs.

AND YOU DON'T TAKE CHANCES

The successful use of over two million Reed Super Shrink-Grip Tool Joints has proved beyond doubt that there are no safer tool joints made. Ask your Reed Representative for the full story.

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Mohawk Drilling Co. Oklahoma City

History.—Mohawk Drilling Co. was formed in 1939 in Illinois with one rig and added another shortly afterward. It did considerable drilling in West Edmond field in 1944, and entered Texas in the spring of 1945. The company moved its headquarters to the Apco Tower, Oklahoma City, in August 1945. It kept operating in Illinois, however, until the spring of 1947.

Operations.—The company operates three rotary rigs, of 7,500-ft., 5,000-ft., and 4,500-ft. depth capacities. Two of the rigs are located in Oklahoma and the third in the Abilene, Tex., area. The company has production in Illinois, Indiana, Texas, and Oklahoma. An affiliated company, H.R.H. Drilling Co., Abilene, operates two strings of cable tools.

Personnel.—The company is owned by H. L. Harrison and John J. Hassler. The latter is president and manager. Production superintendent is A. D. White, with offices in Edmond. Toolpushers are F. D. Rowlett, Chickasha; Alva Rose, Wetumka; and A. W. Roach, Albany, Tex. Roach also is manager of H.R.H. Drilling Co.

Sidelights.—Tools of this company drilled two discovery wells in 1949, bringing in the South Wetumka pool opener in January, and the South Okemah pool opener in September. It started 1950 by drilling a pool opener in Lincoln County with its 1 Malloy wildcat. The company, operating with Warren Wright, recently completed three producing wells in Garvin County.

McChesney Drilling Co. is drilling for Glendale Oil Co. at 1 Embree, 25-14n-77w, in the South Lake Hattie area, Albany County, Wyoming.

M. J. Delaney Drilling Co., Dallas, has the contract for Allen Guiberson and R. J. Caraway 1 Burkett, a 7,500-ft. Woodbine exploratory test in the J. B. Mensell Survey, 2 miles northwest of the Pine Mills sub-Clarksville field, Wood County, East Texas. It also has just started drilling for C. Andrade III at 1 Hopkins, a northwest offset to Continental Oil Co.'s recent gas-distillate discovery well at Tennessee Colony, Anderson County, also in East Texas. The latter location is in the A. G. Monroe Survey.

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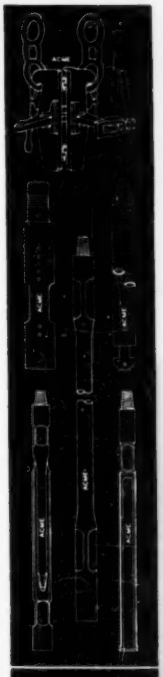

See Acme's latest condensed Catalog and tool-use Manual in Composite Catalog (up front—in Vol. 1). Or mail penny postal TODAY for your copy. Cover-to-cover full of valuable information for Cable Drillers.

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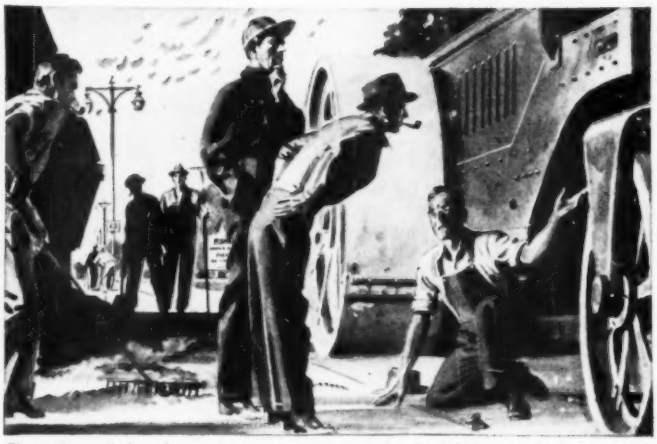
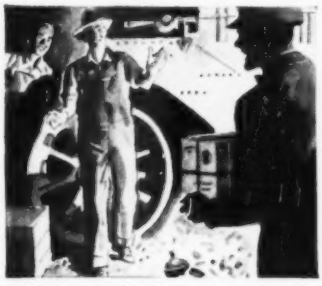
Contractor saves penalty of $500 —by investing $3.84 in Air Express



Time clause in housing project paving contract stood good chance of being invoked when equipment broke down at 3 P.M. So 10-lb. carton of replacement parts was Air Expressed from 1200 miles away. Delivered in just 8 hours. The Air Express charge was only $3.84—and contractor completed job on time.



$3.84 is small indeed, since it covers door-to-door service. Anytime delivery, 7 days a week. Makes the *world's fastest* shipping service the most convenient.

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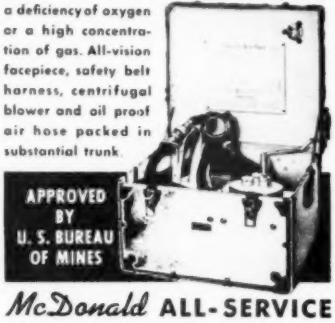

McDonald ALL-SERVICE GAS MASK Where sufficient oxygen appears to support life, protects against all poisonous gases including carbon monoxide.

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NATURAL GAS

Panhandle, Trunkline Cases To Be Heard February 27

Federal Power Commission has set hearings February 27 in Washington, D. C., on applications of Panhandle Eastern Pipe Line Co. and Trunkline Gas Supply Co. which are seeking authority to build pipe-line facilities to carry additional natural gas to Midwest markets.

Trunkline is proposing to construct a 740-mile Louisiana-to-Illinois line designed to carry about 250,000,000 cu. ft. of gas per day for delivery to Panhandle. Estimated over-all cost of this project is approximately $85,000,000.

Panhandle is seeking authorization to expand its system capacity to enable it to transport the 250,000,000 cu. ft. of gas and plans to build 170 miles of pipe line and to install 16,000 hp. in compressor units at existing stations. These facilities, to be located in Illinois, Indiana, and Michigan, are estimated to cost $14,689,500.

Hearing Set March 7 on Eight Gas-Service Plans

Consolidated hearings will begin March 7 in Washington, D. C., before Federal Power Commission on eight applications, including three which involve natural-gas service to the New England area.

Three other applications propose construction of facilities for resale of gas in northeastern Ohio; service in New York State; and sale of gas in West Virginia. Tennessee Gas Transmission Co. would supply all or part of the gas in all the cases.

The proposals to serve New England involve applications filed by Tennessee, Transcontinental Gas Pipe Line Corp., and Northeastern Gas Transmission Co. Tennessee and Transcontinental propose to construct facilities to supply natural gas to Northeastern, which in turn is seeking authorization to construct a pipe line system for the transportation and sale of natural gas at wholesale in the six New England states.

Applications to build facilities for service in Ohio were submitted by Erie Gas Service Co., Inc., Lake Shore Pipe Line Co., and Grand River Gas Transmission Co. All three companies propose to purchase natural gas from Tennessee at a connection in western Pennsylvania.

In the New York State proceeding, New York State Natural Gas Corp. has asked the FPC to authorize extensions and additions to its present transmission system and to its underground-storage capacity, and the sale and delivery of natural gas to Central New York Power Corp. and New York Power & Light Corp. (recently consolidated as Niagara Mohawk Power Corp.) for distribution in Albany and other areas now served by them in New York State. The plan calls for Tennessee to supply gas to New York State Natural.

Tennessee, in the final application involved in the eight consolidated proceedings, has applied to FPC for authorization to construct and operate a sales-meter station at a point on its main transmission line in Kanawha County, West Virginia, and to sell and deliver at that point 5,000,000 cu. ft. of natural gas per day to Godfrey L. Cabot, Inc., for resale by the latter in Fayette and Kanawha counties, West Virginia.

Hearing Is Postponed

A hearing previously scheduled to begin in Washington, D. C., on January 18 in the proceeding involving suspension of Atlantic Seaboard Corp.'s proposed natural-gas tariff, has been postponed until February 20 by Federal Power Commission, at the request of Atlantic Seaboard and Washington Gas Light So., an intervener in the proceeding.

Natural Gasoline

National L.P.G. Advertising Campaign to Get Under Way

The national advertising campaign to promote the sale of liquefied petroleum gas is about to start after several months of preparatory work, Howard E. Felt of Warren Petroleum Corp. and a member of the National Committee for LP-Gas Promotion announced last week.

Addressing a meeting of the Tulsa Chamber of Commerce devoted to the L.P.G. industry, Felt said that special efforts will be made to promote use of the product for heating and cooking in farm homes and others not connected with gas mains and also for commercial and industrial uses.

He explained that the recent increase in the number of natural-gasoline plants due in large part to requirements of conservation in oil production, has caused a surplus of L.P.G. instead of the shortage that existed during the war years. The committee, composed of producers and distributors of L.P.G. and gas equipment, will assist dealers in finding new markets, particularly during the summer off-peak season.

At the same meeting K. R. Rugh of Phillips Petroleum Co. described the tremendous growth of the industry during the past 10 years and said that L.P.G., either in individual tanks or distributed through mains, now serves as many homes as are served with manufactured gas and two-thirds as many as are served with natural gas.

Program Committee Named For Annual N.G.A.A. Meet

John F. Lynch, president, La Gloria Corp., Corpus Christi, Tex., has been named to head the program committee for the twenty-ninth annual convention of the Natural Gasoline Association of America. The meeting is scheduled for April 24-26 at the Texas Hotel in Fort Worth.

Other members of the committee, announced by James E. Pew, Sun Oil Co., Philadelphia, N.G.A.A. president, are: Z. C. Ambrose, Southwest Gas Producing Co., Monroe, La.; W. L. Bowser, Atlantic Refining Co., Dallas; Otha H. Grimes, Grimes Gasoline Co., Tulsa; F. M. Matheny, Sid Richardson Gasoline Co., Fort Worth; Ralph Worley, Parade Co., Shreveport; and W. H. Vaughan, Tide Water Associated Oil Co., Houston.

Cities Service's Chico Gasoline Plant on Stream

Cities Service Oil Co.'s Chico natural-gasoline plant in Wise County, Texas, 45 miles northwest of Fort Worth, is now on stream.

The plant, constructed in 6 months' time, at present is processing approximately 12,000,000 cu. ft. of gas daily. It was so designed that capacity can be expanded to 22,500,000 cu. ft.

The plant has both high-pressure and low-pressure gathering facilities.

Mines Bureau Report Shows Natural-Gasoline Use Up

Natural gasoline and allied-products demand at plants totaled 6,064,248,000 gal. in the first 11 months of 1949, an increase of 422,583,000 gal., or 7.5 per cent, from the corresponding 1948 period, the U. S. Bureau of Mines reported.

Production totaled 5,943,948,000 gal. during the period, an increase of 398,633,000 gal.

The bureau at the same time reported that production in November reached an all-time record high of 19,928,000 gal. daily, for a total of 597,851,000 gal.

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REFINING

Coastal Petroleum Sells Gulf Refining Facilities

Coastal Petroleum Corp., Mobile, Ala., has sold its refinery and other facilities in the Mobile area to American Bitumuls, a subsidiary of Standard Oil Co. of California, for approximately $700,000.

John T. Cochrane, Jr., Coastal's president, reported the properties sold included the refinery and distillation unit, a loading dock, and storage tanks with capacity of 385,000 bbl. The refinery is located on Blakeley Island, across Mobile River from the city of Mobile.

C. W. Stewart, president of American Bitumuls, San Francisco, said announcement would be made later regarding his firm's plans for the newly acquired properties. The refinery is rated at 8,000 bbl. daily crude-charge capacity.

Work to Begin Soon on New Deep Rock Research Lab

Deep Rock Oil Corp. announced last week that work on its new research laboratory at the Cushing, Okla., refinery will begin around February 1.

Contract for the $56,000 structure was let to the Austin Co. of Houston, and plans call for construction work to be completed by June.

The one-story laboratory is to be erected just west of the Santa Fe Railroad's tracks, on the north side of the refinery area.

The research laboratory is part of an extensive modernization and enlargement program at the refinery which was launched by the company several months ago.

Tide Water Instructing Army Men at Bayonne Plant

In compliance with a request from the U. S. Army, Tide Water Associated Oil Co. is presently instructing five Army enlisted men in the operation and overhaul of octane engines at its research department's automotive laboratory located at the company's Bayonne, N. J., refinery.

The course of instruction which began January 9, is part of the 29-week course covering the analysis of petroleum products, given for Army personnel by the Quartermaster Corps petroleum laboratory at Caven Point, Jersey City. Following this Army training, these men, most of whom are quartered at Fort Wadsworth, S.I., will serve with the petroleum section of the Army Quartermaster Corps in all parts of the world.

The instruction at the Tide Water laboratory is under the supervision of John T. McCoy, general supervisor of research and development; C. Wal-

NELSON REFINERY-CONSTRUCTION INDEX

Appears in the first issue of each month.
Explanation—Cost-imating No. 61, December 15, 1949, pages 91, 92.
Compiled by W. L. Nelson—Refinery Consultant—Tulsa.
Indexes of Individual Items—January, April, July, and October.

INDEX (1946 = 100)

	1947	1948	Oct. 1949
Centrifugal pumps	109.0	120.0	119.0
Reciprocating pumps	130.1	143.1	144.6
Compressors	114.0	128.0	117.0
Engines	109.0	120.0	110.0
Motors	*122.0	*135.0	*130.0
Transformers	*122.0	*135.0	*130.0
Instruments	†113.0	†120.0	†123.1
Miscellaneous equipment average	*117.0	*128.7	*124.8
Materials component	123.0	140.5	142.3
Labor component	113.5	128.0	140.0
Refinery construction index	117.1	132.8	140.9

*Subject to revision. †Revised estimate.

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ter Frankenfield, automotive-laboratory supervisor; and William H. Bacon, Jr., automotive-engineer group leader. Actual instruction is being given the Army personnel by the company's knock-test operators at the laboratory.

A.S.T.M.'s Committee D-2 Will Meet February 19-24

A series of meetings of American Society for Testing Materials' Committee D-2 on Petroleum Products and Lubricants will be held at the Shoreham Hotel in Washington, D. C., February 19-24. Three technical symposiums are to be held, covering instrument oil, recent developments in instrumental methods for the determination of tetraethyl lead in gasoline, and methods for measuring viscosity at high rates of shear.

The first two symposiums are scheduled for February 21, and the viscosity symposium is set for February 24.

Committee D-2 has approximately 80 meetings scheduled throughout the week, and a wide variety of important problems concerning petroleum products will be considered by the various groups.

Acting chairman of the committee is O. L. Maag, Timken Roller Bearing Co., Canton, Ohio, and secretary is W. T. Gunn, American Petroleum Institute, New York City.

New Oil-Separating Plant To Be Built at Okmulgee

Work will begin soon on a new oil-separating and processing plant at Okmulgee, Okla., by Phillips Petroleum Co., Bartlesville.

K. S. Adams, president, said the plant will be placed on a full-time operating basin when completed, but gave no indication of the installation's cost.

The lubricating division at Okmulgee was shut down last year following completion of a lubricating-oil manufacturing plant at Kansas City. The Okmulgee installations are used in producing gasoline, diesel fuel, kerosine, fuel oil, and heating distillates.

The new facilities will be in operation by summer, Adams indicated.

Blaw-Knox Establishes New Fuels Synthesis Department

A new chemicals and fuels synthesis department has been announced by Blaw-Knox Co., Pittsburgh. This new division will be concerned with the engineering and construction of fully integrated units for synthesizing chemicals and fuels from natural gas or other fuel sources, employing the Fischer-Tropsch process.

Agreements have been completed with Ruhrchemie and Lurgi, German firms, for licenses and for process information on coal gasification and production of chemicals from synthesis gases derived from coal.

Work Progressing on New Texaco Ohio Terminal

Work is progressing on The Texas Co.'s new $1,000,000 waterfront terminal on the Cuyahoga River at Cleveland, and the company expects to have it in operation by May.

The plant will include a warehouse, bulk-storage facilities, offices, and a repair shop. Refined products will be delivered to the new distribution plant by lake tankers.

Capacity of storage tankage being built will be in excess of 400,000 bbl.

Plant Being Dismantled

Shell Oil Co.'s 6,700-bbl. per day crude distillation plant at Coalinga, Calif., is now being dismantled, according to C. E. Davis, vice president of refining. The plant has not been operated for some time.

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Mutual's Booklets on CHROMATES

Mutual Chemical Company has available a wide list of pamphlets describing applications in which chromates have been used effectively in various industries. Listed below are four of the newest booklets which are available without obligation.

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☐ Serial No. 55 — "Corrosion Inhibition with Chromate in the Oil and Gas Industries."

☐ Serial No. 56 — "Some Properties of Technically Important Hexavalent Chromium Compounds."

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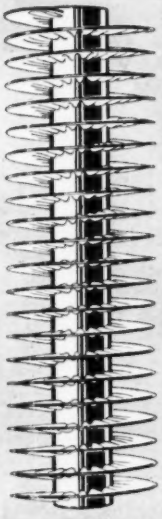

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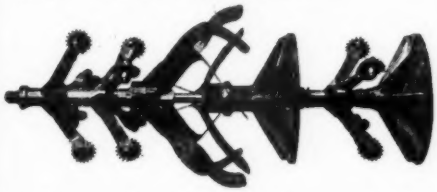

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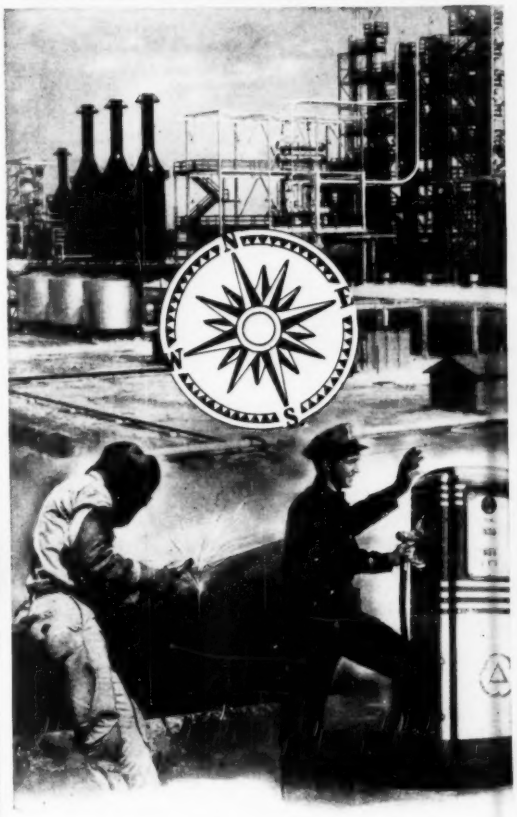

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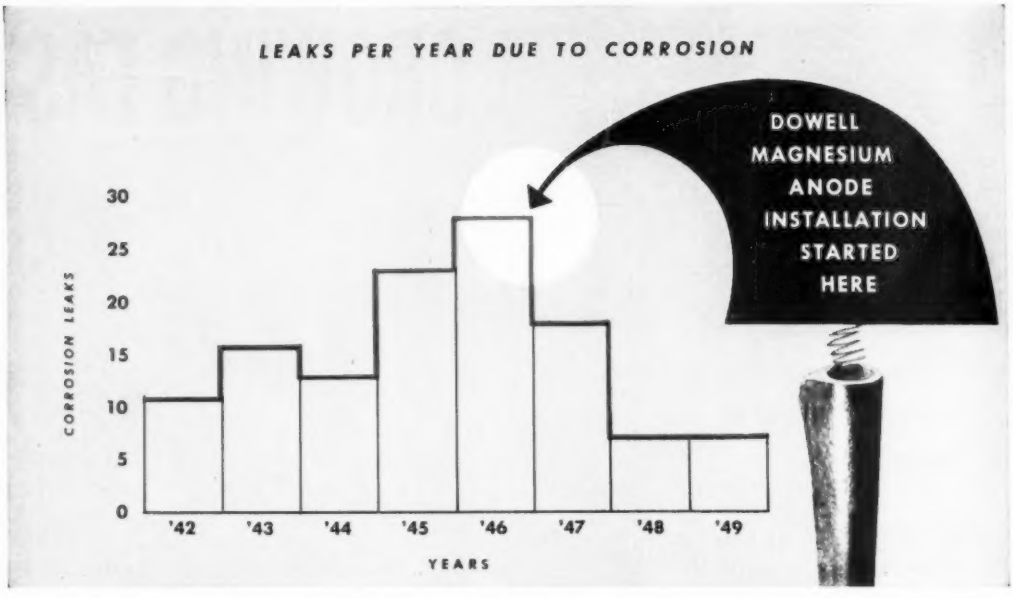

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PIPE LINES

Phillips Petroleum Will Extend Products Line

K. S. Adams, president of Phillips Petroleum Co., has announced plans for the early extension to Denver of the present 200-mile petroleum-products pipe line now in operation between the Phillips Oil Co. refinery at Phillips, Tex., and LaJunta, Colo. This extension will be 6 in. in diameter and 155 miles long and will be owned 85 per cent by Phillips with the remainder owned by Shamrock Oil & Gas Corp.

It is planned to complete the line and a terminal at Denver during this year. When the Borger-LaJunta section was constructed in 1947, the extension to Denver was deferred because of material shortages.

When completed it will have latest methods used on underground pipe to combat soil corrosion, modern electrical-pumping equipment, latest-type safety devices to control high pressures and many other new pipe-line features.

At the Denver terminal storage tanks will be constructed to handle more than 5,000,000 gal. of gasoline and 300,000 gal. of liquefied petroleum gases.

With completion of these facilities, more than 8,000 bbl. of petroleum products can be moved daily from Phillips' refinery in Texas to Denver. This will give Phillips an economical and efficient method of handling its products for customers in the Rocky Mountain area.

Algonquin Proposes Gas Line in New England Area

Algonquin Gas Transmission Co., Boston, has applied to Federal Power Commission for authorization to build a $27,549,100 natural-gas pipeline system in the New England area.

The proposed project, which would have an initial delivery capacity of approximately 250,000,000 cu. ft. per day, would carry natural gas to distributing companies serving communities in Connecticut, Massachusetts, Rhode Island, and New Hampshire. The company said that whenever it proves economically feasible to do so, it will apply for authorization to extend the service to Vermont and Maine.

The pipe-line system would include a main 276-mile line extending from a point of connection with Texas Eastern Transmission Corp.'s facilities near Lambertville, N. J., to a point in the Boston area. Algonquin said it has entered into an arrangement with Texas Eastern for that company to undertake to supply the natural-gas requirements of the proposed New England project.

In addition to the main line, Algonquin plans to build approximately 492 miles of laterals, and a compressor station near Middletown, Conn. The company said the initial delivery capacity of the system could be increased by at least 100,000,000 cu. ft. per day by the addition of another compressor station, and extra units at the proposed Middletown station.

Algonquin listed approximately 60 companies which it said it believes economically feasible to serve at the present time, and named another seven companies to which service might be extended in the future, if and when the service can be shown to be feasible. The project would be financed by the sale of debt securities and common stock, the application says.

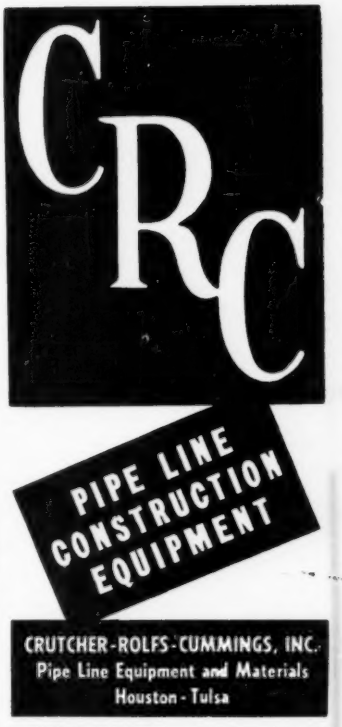
Texas Eastern, the company from which Algonquin plans to obtain its natural-gas requirements, now has an application pending before the commission proposing construction of pipe-line facilities which would make available up to 200,000,000 cu. ft. of gas per day to the New England area. However, Algonquin said that under its arrangement with Texas Eastern, the latter company will either file a new application or amend its existing application by requesting FPC authorization to build facilities necessary to supply Algonquin.

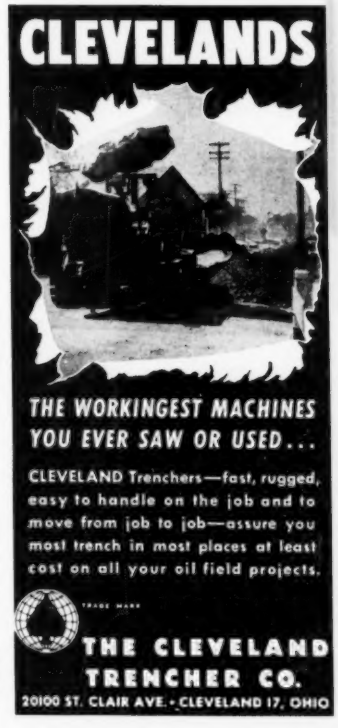
In another proceeding pending before the commission, Northeastern Gas Transmission Co., Boston, is seeking authorization to build a 511-mile pipe-line system for transportation and sale of natural gas at wholesale in the six New England states. Northeastern would obtain its gas supplies from Transcontinental Gas Pipe Line Corp. and Tennessee Gas Transmission Co. An FPC hearing in this matter will commence March 7 in Washington, D. C.

Order Placed for Pipe for Brazilian Products Line

Santos Jundiai Railroad has placed orders for pipe for the Brazilian pipeline project, and letters of intent have been issued for pumping equipment.

The project, estimated to cost $9,500,000, will include the 40-mile, 10-in. Santos-Sao Paulo-Campinas products line and the 30-mile, 18-in., San-

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tos-Sao Paulo fuel line. There will be four pump stations, each powered with 1,000-hp. pumping equipment which will operate on hydroelectric power.

William G. Heltzel, consultant on the engineering staff of Williams Brothers Co., who designed the project, left for Brazil February 1. W. H. Stueve, executive assistant, Oklahoma Gas & Electric Co., is acting as electric-power consultant.

Hearing Set February 20 On Texas Illinois Proposal

A hearing will begin February 20 in Washington, D. C., by Federal Power Commission, on application of Texas Illinois Natural Gas Pipeline Co. to construct a 1,254-mile natural-gas pipe line from Texas to Illinois.

In addition to the main line, which would originate southwest of Houston, and extend to the Joliet, Ill., area, the company plans to build a 58-mile line from Joliet to Volo, Ill., and to establish a connection with the proposed facilities of Piedmont Natural Gas Corp., at or near Greenville, Miss. Estimated cost of the project, excluding any facilities necessary for deliveries to Piedmont, is $120,942,000.

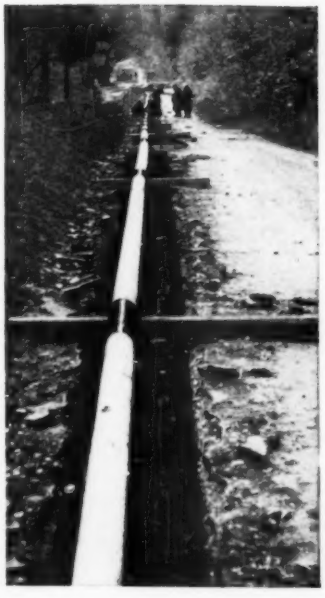
Texas Illinois proposes to deliver an average of 275,000,000 cu. ft. of natural gas per day to Piedmont, which now has an application pending before the commission for authorization to build a pipe line from Texas to the Carolina-Virginia region.

In addition, Texas Illinois is planning to sell gas to utility companies which are now buying from Natural Gas Pipeline Co. of America and its affiliate, Chicago District Pipeline Co. Texas Illinois proposes to meet the requirements of these customer companies over and above the amounts now available to them from Natural and Chicago District and would make deliveries through the existing systems of these two companies. Sales of gas to other utilities operating in the general territory adjacent to the proposed new line are also planned by Texas Illinois.

"Toughest Inch" Completed As Unusual Line Project

Because of the rough mountainous country traversed by the recently completed 268-mile, 26-in. line for Atlantic Seaboard Corp. and Virginia Gas Transmission Co., unusual measures were required for its construction.

H. C. Price Co. built the major part of the line with Ray L. Smith & Son, Inc., handling 70 miles on the west part of the line. The entire project extended from a point near Charleston, W. Va., to Rockville, Md., near Baltimore. The line was finished



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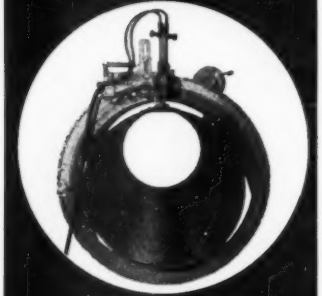

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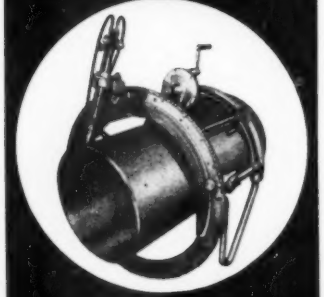

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ahead of schedule, according to Harold C. Price, president of the Price company.

Total cost of constructing the line was approximately $15 per foot or almost $80,000 per mile. Approximately $3,000,000 worth of construction equipment was used on the undertaking.

First Pipe for Canadian Line Shipped to Job-Site

The first carloads of Canadian pipe for the Interprovincial Pipe Line Co.'s 1,150-mile Edmonton - Superior line were shipped recently from the Hersey Tubes, Ltd., plant at Welland, Ont. This shipment of 16-in. pipe will be used for the Regina-Gretna, Man., section.

Construction operations will begin as soon as heavy equipment can be used in the spring.

Quantity production of pipe of this dimension had never been attempted in Canada before Page-Hersey's new $5,000,000 plant went into operation.

The new plant converts flat steel plate into finished pipe in 10 to 15 minutes. Each length of pipe—about 40 ft.—weighs a ton.

Contract Let for 25-Mile Michigan Crude-Oil Line

MUSKEGON. — Construction contract for a 25-mile, 6-in. oil pipe line from the Kimball Lake oil field, Newaygo County, to Naph-Sol Refining Co.'s Muskegon refinery has been let to Young Construction Co., Olney, Ill.

Construction is scheduled to begin February 1 with completion date of March 1.

Completion of Naph-Sol's pipe line will in effect tie all major Michigan refining centers into an integrated and connected pipe-line system allowing the movement of either Michigan or out-of-state crude to most all centers via pipe-line trunks.

Portable Pipe Line on River Now in Operation

An 1,800-ft., 8-in. portable pipe line, built by Emergency Illinois Waterway Pipe Line Co. around the Lockport, Ill., locks on the Illinois River, has been placed in operation.

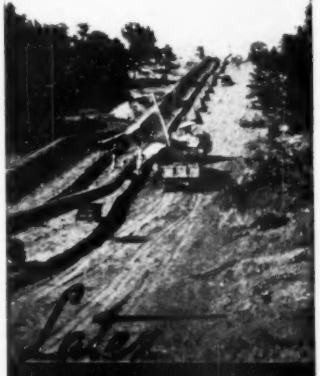
The company, made up of eight Chicago-area oil firms which rely on river movement for transporting petroleum products, is a 5-year non-profit enterprise. The line was built on a portable scale so that it can be moved to other locks in the area if they are closed for repairs. The Lockport locks are expected to be closed for 6 weeks undergoing repairs.

"Steep Inch" to Be Completed in July

Creole Petroleum Corp. is building a 10-mile, 8-in. products line from Catia de la Mar to Nueva Caracas, on the outskirts of Caracas, Venezuela. It is scheduled for completion in July.

This is joint project of Creole undertaken with Shell Caribbean Petroleum Co. While it is informally known as the "steep inch" it is officially designated as Oleoducto de Tacagua. Construction is being handled by Macca-Panpacific under contract.

Years of experience and specialization, combined with a well integrated organization, result in more efficient pipe line construction.



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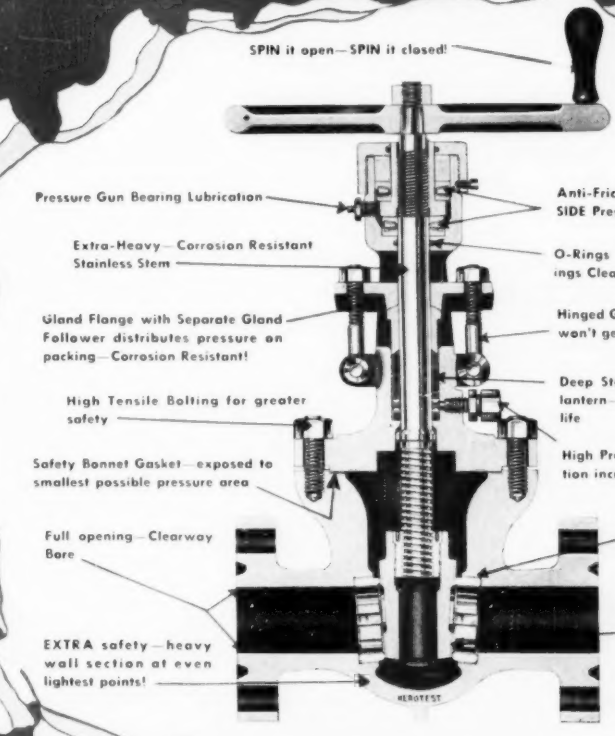
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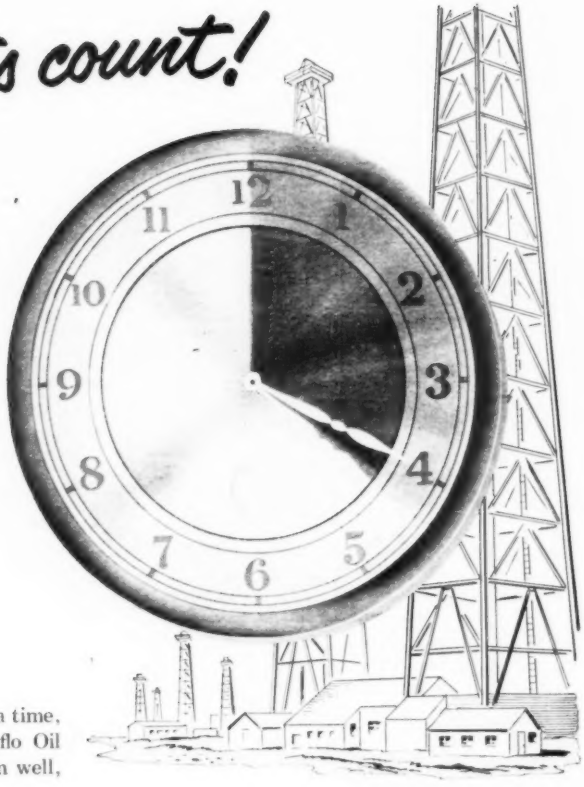

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Exploration and Drilling

Texas Panhandle Test Gets Oil in Penna.

THE first Pennsylvanian oil, in contrast to gas and distillate, has been found on the regional high that lies north of the Amarillo mountains in the Texas Panhandle. Phillips Petroleum Co. 1 Willclo, Section 15, Block 3-T, T&NO Survey, Sherman County, Texas, pumped 225 bbl. per day of 40 -gravity oil through perforations opposite a Pennsylvanian pay zone at 5,844-80 ft.

The new test is about 2 miles south, and presumably regionally downdip from the same company's 1 Kathryn, which found gas in a Pennsylvanian formation, a few hundred feet higher in the section. The Willclo also found gas in the same zone as the Kathryn, and then found the oil below. Both wells hit gas in the regular Permian pay of Hugoton gas field.

Last spring Sinclair Oil & Gas Co. found gas and distillate in a Pennsylvanian formation in Roberts County, some distance southeast, went on deeper, and finally completed an oil discovery in the Mississippian, opening Lips pool. Then in September, Sinclair completed another well in the Pennsylvanian as a gas-distillate producer, about a mile north of the Mississippian discovery.

The regional picture as of the present is a smaller uplift that lies roughly parallel to and north of the regular Amarillo mountain uplift. Starting somewhere northwest of the so-called Sherman dome, it probably is cut off to the northwest by the old positive area of the Las Animas arch. From somewhere east of the arch, it trends generally southeast through Hansford and Roberts counties toward Oklahoma. Just what happens on the southeast end will probably not be known for a long time. Enough wells will have to be drilled to work out a clear picture of what happens around the south end of the Amarillo mountain uplift and the north end of the Wichita uplift. It may be more complicated even than that, as some geologists have pretty good evidence that the Wichita uplift is really made up of two parts, one of which came up after the other. Compared to the Amarillo or Wichita features, the northern Panhandle high is probably of a lesser order of magnitude.

From the wells drilled so far along this high, it is reasonably certain that the northern Panhandle uplift was low enough relative to the Amarillos, and far enough away, to permit normal sorting and then deposition of sediments eroded from the Amarillos. Normal sections of shale, sand, and lime are found, with very little granite wash. However, the northern high was of sufficient relief to show decided thinning of the section on top, and presumably this thinning would be progressive coming from south to north and moving up the south flank and over the top.

Following that line of reasoning, some geologists figure that the new discovery may be downdip enough from the first well to develop a thicker Pennsylvanian section, with the result that a lower sand section came in, and contained oil. This is pretty much a speculation, however, as the Willclo test was drilled as a tight hole and there is a lot of information which is not generally available yet. Regionally the basis for this speculation is undoubtedly sound, but for short jumps in a specific area it could be erroneous.

For the whole northern regional high, however, the finding of real oil in the Pennsylvanian is a big boost. It automatically doubles the chances of any given prospect on a basis of performance to date. Now we know that oil can accumulate in the Mississippian and in the Pennsylvanian. This also makes prospects for finding deep Simpson or Arbuckle production better. In the past we have found a lot of Simpson and Arbuckle oil in geological provinces where conditions look similar to what we now know of this northern Texas Panhandle. Explorationwise, you might say it begins to have a strong resemblance to other areas where we have found much oil.

Of course it would have been better if the Willclo strike had been a flowing well, but a 225-bbl. pumper isn't bad at less than 6,000 ft. How much of the 36-ft. perforated section was good sand is not publicly known yet. It is always possible that the discovery is near the edge of a sandy phase, in which shale breaks have already cut down the effective pay. In that case, even the first well to tap a good reservoir might not have enough kick to flow. Future wells will tell this story, of course.

Charles J. Deegan.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

MISSISSIPPI.—The Carter Oil Co. 1 J. L. Wilson, possible Travis Peak discovery in the Pickens Field area, Yazoo County, Mississippi, has set casing to approximately 8,015 ft. After taking sidewall cores in the Cotton Valley section, operators quit releasing any information on the test. Drilled as a Smackover lime venture, it is bottomed in salt at 12,250 ft. Conventional coring from 11,100 ft. to approximately 12,000 ft. found numerous shows in hard tight Smackover sections. Due to the absence of porosity in this horizon it is reported that production casing will not be set to total depth. Unconfirmed reports are that the well will be completed in the Travis Peak at 7,730-66 ft. If completed as a producer, this will be the first Travis Peak production for the state and first deep producing horizon in the 10-year-old field.

WEST TEXAS.—William Hamm, Jr., Jones & Simpson Drilling Co. 1 Dee Myers, 1½-mile north extension to the Diamond M field of Scurry County, completed for 1,080 bbl. of oil a day. Burdell Oil Co. 1 Eula Keller, west extension to North Snyder in Section 340, plugged back from 6,927-6,880 ft. and acidized open hole from 6,654-80 ft. It swabbed 27 bbl. of oil an hour, then headed oil when tubing and packer was pulled. It was to be drilled out to 6,895 ft. and completion attempt made in open hole.

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N. CENTRAL TEXAS

Conglomerate Discovery Made in Jack County

WICHITA FALLS.—Jack County completions this week included a conglomerate discovery 5 miles north of Jacksboro, two shut-in gas discoveries, and a dry semiwildcat.

The new well was L. M. Lockhart and C. C. Glasscock 1 L. A. Worthington, SPRR Survey, A-575. Total depth was 5,410 ft. Seven-inch casing was set to 5,409 ft. and perforations made from 5,383-88 ft., from which it flowed 176 bbl. of 39.5°-gravity oil a day, through ¼-in. choke, under 875 psi. tubing pressure. Gas-oil ratio was 1,050 cu. ft.

Russell Maguire 1 Ruth Richards, B. F. Terry Survey, A-611, 5 miles north of Perrin, had total depth at 5,379 ft., and from perforations at 4,558-60 ft. gaged 4,300,000 cu. ft. of gas daily. Shut-in pressure was 1,200 psi.

Mid-Continent Petroleum Corp. 2 G. W. Fowler "A," C. H. Simpson Survey, A-1654, reported a semiwildcat 4 miles southwest of Cundiff, had total depth at 6,494 ft., perforated casing at 5,488-5,506 ft., and was estimated at 2,500,000 cu. ft. of gas daily.

Russell Maguire 1 A. W. Shawver, Arnold & Barrett Survey, A-1025, 6 miles north of Perrin, was dry at 4,805 ft. Drill-stem tests on the conglomerate at 4,498-4,544 and 4,754-64 ft. had no shows.

Various shows of oil were reported at Akin & Dimock 1 C. F. Campbell, Parker County wildcat in the C. A. Cabiness Survey, 8 miles north of Weatherford. A Strawn sand was drilled from 2,763-75 ft., then drill-stem tested for 1 hour, to recover 3 ft. of gas and 30 ft. of gas-cut mud.

Drill samples showed oil in lime from 3,241-3,306 ft., total depth, and a 90-minute drill-stem test of the interval recovered 315 ft. of gas-cut mud having light oil show, plus 180 ft. of drilling mud. Bottom-hole pressure was 945 psi. in 15 minutes. Operators ran casing to 3,250 ft. for tests.

In northeastern Parker County, 2 miles southwest of Springtown, W. L. Hinds, Trustee, 1 Z. T. Wynn, Block 115, T&P Survey, was drilling below 3,625 ft. in sandy shale, and believed to be in the Caddo.

In Wise County, Leland Fikes and Standard-Fryer Drilling Co. 1-A Conley, M. Swift Survey, 4 miles southeast of Chico, was drilling below 4,335 ft. A 2-hour drill-stem test in Strawn sand from 4,125-45 ft. recovered 90 ft. of gas-cut mud and 300 ft. of salt water.

Signal Oil & Gas Co. et al 6 Daly Unit, west offset to the Ellenburger gas-distillate discovery of Daly field in southwestern Wise County, was dry at 4,063 ft. The Caddo section was said to be tight. The same operators staked location for 7 Daly Unit, 660 ft. from south and west lines of Block 47, MEP&P Survey, for an Ellenburger test.

Eight miles southwest of Bridgeport, Champlin Refining Co. 1 Stanfield, Austin & Williams Survey, perforated casing from 4,450-4,505 ft. with 300 shots to test a Strawn sand. Total depth was 7,216 ft., in the Ellenburger, plugged back to 4,507 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCAT

Jack County, new field: Chas. H. Kadane 1 S. Castleberry, 467 ft. from S, 1,648 ft. from W lines, J. J. Stephens Sur., A-535, 3 mi. E Jacksboro, TD 5,358 ft., top conglomerate pay 5,107 ft., IP flowed 3,735,000 cu. ft. of gas daily, 70 bbl. distillate, 5-in. casing set to 5,322 ft., perforations not reported.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Davis & Davis 1 C. Campbell Estate, A. Arms Sur., A-5, 10 mi. Olney, dry, TD 1,171 ft.

Frank Wood 1 E. J. Poirot, Lot 45, Blk. 3, Clark & Plum Subd., 2½ mi. SE Scotland, dry, TD 4,761 ft.

Baylor County: Anderson Drilling Co. 1 J. A. Couch, Sec. 7, HT&B Sur., A-171, 5 mi. NW Seymour, dry, TD 3,506 ft.

Cooke County: Joe Blalock 1 J. D. Randall, SPRR Sur., A-970, 9 mi. NW Muenster, dry, TD 3,005 ft., elevation 956 ft.

D. H. Bolin and Wilcox Oil Co. 1 T. Lewis, John Gregg Sur., A-398, 6½ mi. SE Valley View, dry, TD 2,238 ft., light stain and odor 2,038-44 ft.

Wilbarger County: Frank Wood 1 W. T. Waggoner "X," 6-13-H&TC, 3 mi. SW Electra, dry, TD 2,136 ft., sand with oil show 1,066-85 ft.

Young County: L. A. Warren Drilling Co. 1 J. M. Bloodworth Estate, Sec. 194, TE&L Sur., 5 mi. SW Olney, dry, TD 1,152 ft., Gunsight lime 1,077-79 ft.

CALIFORNIA

Newhall Area to See More Deep Testing

LOS ANGELES.—The recent success of the Humble Oil deep test in the Newhall area has apparently encouraged other operators to go deeper with their tests. Nearby in the Del Valle field, R. E. Havenstrite has reached 10,992 ft. in 16 Lincoln, 16-4n-17w. A good head flow has already been obtained following gun perforating of a 135-ft. interval near 10,000 ft. Casing, 7 in., is now set to total depth and the well will be taken deeper.

At Cuyama the original discovery well, 2 Cuyama, is being deepened. Completed depth was 1,990 ft. Redrilling, after setting a whipstock, has now carried beyond 2,500 ft. The objective here is the Dibblee sand. Richfield has moved in to deepen A-1 Wegis-Reyes at 9-9n-25w in the South Cuyama Valley. This wildcat was abondoned last March at a depth of 6,049 ft. How far the try will be carried has not been reported.

In Ventura County, San Miguelito field, Continental Oil Co. has decided to drill ahead in their 65-E Grubb, 25-3n-24w. Present depth is 15,758 ft. The hole has been cleaned out to 14,557 ft. preparatory to deepening.

The Von Glahn Oil Co. is attempting to complete the former P & D Oil Co. well, 3 Monro. Location is in the Buena Vista Hills areas, 16-32s-24e. Casing has been perforated at various intervals through 3,009-3,168 ft. Bailing operations are now under way.

Mark Morris has extended the Rothschild West Edison discovery with 2 Brandt, 22-30s-29e. The well was completed on the pump for about 100 bbl. daily of 18°-gravity oil. Top of the oil sand was reached at 2,980 ft. with base at 3,120 ft. Chanac was topped at 2,870 ft. The well bottomed in the Santa Margarita, at total depth 3,379 ft. The Santa Margarita was gray

At Paloma, Western Gulf has converted 23-3 Paloma Unit to a gas injection well. The well has been idle and shut in for some time at 10,346 ft.

Superior Oil as operator of the Rio Bravo field is redrilling the former 34-1 Kernco of Union Oil Co. Total depth was 11,302 ft. with brown shale topped at 10,320 ft., and top of the oil sand at 11,240 ft. The Miocene was reached at 7,700 ft. Redrilling has carried past 9,700 ft.

Two wildcats have been scheduled for the Carbon Canyon area of San Bernardino County. In Section 31-2s-8w, C. D. Howe will drill 1 Downs. J. W. Brashears will drill 1 Dana at 26-1s-9w.

The 55 Tulare Farms, deep test of Trico Oil & Gas Co. in the Trico gas field, has passed 9,500 ft. About 8 miles north of the

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field Shell O.I Co. has spudded 1-1 Harvester Unit. Location is 11-23s-21e.

Cardox Western, Inc., has staked location for two carbon dioxide wells in the Imperial Valley. The wells will be B-1 and B-2. Both are in Section 3-11s-13w.

CALIFORNIA WILDCAT FAILURES

Fresno County, Raisin City area: Harry C Long & Asso. 88, 22-15s-19e, dry, TD 5,200 ft., elev. 219 ft.

Kern County, Ant Hill area: B. C. Mackey 1 Petromont, 14-29s-29e, dry, TD 2,150 ft., elev. 1,006 ft.

Devils Den area: Universal Consolidated Oil Co. 2 Devils Den fee, 23-25s-18e, dry, TD 2,577 ft., elev. 600 ft.

Monterey County, Watsonville area: Jergins Oil Co. and Seaboard Oil Co. 2 Blohm, 33-12s-2e, dry, TD 2,188 ft., in granite, elev. 75 ft.

Orange County, Fullerton area: Rothschild Oil Co. 1 Armstrong, 14-3s-10w, dry, TD 2,725 ft.

MISSISSIPPI

Testing on Possible Travis Peak Discovery

JACKSON.—In Pickens field area, Yazoo County, Mississippi, Carter Oil Co. 1 J. L. Wilson, 30-12n-3e, possible Travis Peak discovery, has set 7-in. casing to approximately 8,015 ft. After taking A-1 sidewall cores in the Cotton Valley section, operators quit releasing any information on the test. Testing operations are expected to begin as soon as cement sets.

At Possum Corner field, Wilkinson County, American Republics Corp. 2 Crosby Lumber & Manufacturing Co., 4-4n-2w, ran 5½-in. casing to 5,178 ft. and cemented with 250 sacks. Casing was perforated at 5,118-19 ft. and 5,130-31 ft. and squeezed with 245 sacks. Casing was then perforated at 5,124-28 ft. opposite Wilcox sand. At last report operators were swabbing but results of swabbing test have not been reported. This test is an east offset to the field discovery well, Danciger Oil & Refining Co. 2 G. W. Armstrong.

Approximately 2 miles west of the big Mallalieu field, Lincoln County, Peterson Drilling Co. and E. F. Neely have made a successful completion at the 1 George Ziegler, 2-6n-7e. The well is reported to be pumping 175 bbl. per day through perforations at 10,554-72 ft. This well was originally drilled by Big Chief Drilling Co. and E. H. Osborn and was abandoned last August after numerous squeeze jobs failed to shut off salt water. Present operators took over the well, cleaned out the hole, and reperforated.

In Adams County, south of Natchez, Humble Oil & Refining Co.'s two probable discoveries are still in the process of having pumping equipment installed. It is still not known just when testing on pump will start on either the 1 Mrs. F. Byrnes, 13-5n-3w, or the D-1 Mrs. C. L. S. McKittrick et al, 50-7n-3w.

Two new wildcats were staked in Mississippi during the week, both in Adams County. Alabama reported one new wildcat in Lawrence County.

MISSISSIPPI WILDCAT FAILURES

Adams County: Petersen Drilling Co. 1 G. W. Hightower, 13-7n-1w, dry, TD 6,508 ft.

Dan L. Reynolds-Sohio-Danciger Oil & Refining Co. 1 George W. Armstron, 28-5n-2w, dry, TD 6,564 ft.

Stone County: Helmerich & Payne, Inc., 1 I. C. Knox, 19-7n-4w, dry, TD 9,515 ft.

MICHIGAN

Richfield Show Is Undergoing Testing

MOUNT PLEASANT.—Brazos Oil & Gas Co. 1 Miltner & Shaffer, SE NW 1-24n-7w, Pioneer Township wildcat, Missaukee County, was under test in the Richfield zone with oil and gas showing. Extent of this Richfield zone show had not been definitely determined.

Richfield top (base of the big anhydrite) was logged at about 4,528 ft., and black lime, believed to be the base of the so-called Richfield horizon, was picked at 4,704 ft. Hole was drilled to 4,708 ft., total depth. Oil and gas shows came in at about 4,681-4,700 ft., with about 500 ft. of bottom water showing from 4,700-08 ft. The show was estimated at 5 bbl. of oil and about 10,000 cu. ft. of gas.

Plub-back operations from 4,708 ft., total depth, to 4,698 ft. had been completed and it was believed that all bottom-hole water had been shut off. Some water was believed to be showing from up the hole, however.

Tubing was scheduled to be set on a packer and the shows will be extensively tested and stage-acidized. The Richfield oil show, found just above the black lime section, appeared to have come in much deeper in the horizon that is typical in other Richfield producing areas, but Richfield oil-zone depths vary from field to field in this state.

This Brazos wildcat, first for the company in Michigan, followed a highly competitive land play and an extensive core-drill program. Well has been one of the most closely watched basin area wildcats since it was started and first created more than passing interest when a Traverse oil show was logged at 2,673 ft. This Traverse show was not tested, but may be reworked after Richfield tests are completed.

MICHIGAN WILDCAT FAILURES

Allegan County, Lee Township: Norman L. Stevens 1 Starback, NW NW SE 29-1n-

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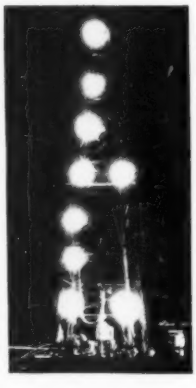

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15w, Trenton 2,842 ft., dry, TD 2,848 ft.

Mecosta County, Chippewa Township: Sohio Petroleum Co. 1 Brewer-Smith et al, NE NW SW 35-16n-8w, Dundee 3,771 ft., dry, TD 3,786 ft.

Oceana County, Elbridge Township: Mercer Oil Co. 1 Hoffmeyer, SW NW NE 28-15n-16w, Monroe 2,759 ft., dry, TD 2,763 ft.

Osceola County, Sherman Township: Robert Bond 1 Worst, NW NE NE 26-20n-9w, Reed City 4,197 ft., dry, TD 4,300 ft.

Van Buren County, Columbia Township: W. Spencer Coo, Inc., and C. E. Weller 1 Roberts, NE NW SW 20-1s-15w, Traverse 1,133 ft., dry, TD 1,135 ft.

CANADIAN FIELDS

Thicker D3 Pay Found By New Golden Spike Well

CALGARY.—Imperial 5 Golden Spike, LSD 1, 27-51-27w4, ran a drill-stem test which gave a flow of clean oil, at a depth which gives the well a D3 zone oil-bearing thickness of 594 ft., 48 ft. more than the record thickness of pay previously established at Imperial's Nos. 1 and 4 wells at Golden Spike.

No. 5 well, ⅓ mile north of No. 1 and ½ mile west of No. 4, ran its important test of the interval 5,915-60 ft. The test brought a maximum gas flow rate of 248,000 cu. ft. daily, with a flow of oil reaching surface in 42 minutes. Tester was closed 4 minutes later. When pipe was pulled, recovery consisted of 3,120 ft. of oil and 30 ft. of drilling mud. There was no water.

Since the test, diamond coring has been continued on to 6,113 ft. Another test is scheduled to be run shortly.

Based on Imperial's discovery well, which cored and tested through the D3 zone and below it, No. 5 had been expected to show about 540 ft. of pay zone. D3 was topped 5 ft. lower than at No. 1. The discovery well cored and tested 545 ft. of oil-bearing pay, with test at bottom level giving up some salt water. Then the bit entered tight and totally unproductive formation.

Canadian Gulf Oil Co., continuing its extensive exploration and development program in the Stettler region, about 100 miles northeast of Calgary, is preparing location for a step-out driller about 11½ miles north of its Devonian oil discovery and about 9 miles north of British Empire Development's Devonian oil well. Gulf has also completed its second Stettler-field oil well apd placed it on production with a substantial open-flow potential from the D3 zone.

The new venture, 14 Gulf-Brodie, LSD 14, 11-20w4, will be drilled immediately. Crew is now readying location and it is expected that rig will be moved to site within the next few days.

The 14 Brodie is located about 7 miles northwest of Stettler town, and about 6¾ miles north-northeast of 1 Casagama, Lower Cretaceous oil discovery well, nearest previous drilling.

Canadian Gulf currently has three other wells under way in the Stettler area, in addition to the new completion. The new producer, Gulf 6 N. J. Ellis, LSD 6, 10-38-20w4, ⅜ of a mile northeast of the No. 4 discovery well, rated an initial potential of 1,076 bbl. daily from the D3 zone. The well, also an assured oil success in the D2, with 74 ft. of oil-bearing porosity in that horizon, completed drilling in D3 at 5,395 ft., a few feet above the water line. A further well will likely be drilled at a later date to tap D2 production at this site.

Gulf-C. P. R. 13 Ellis, LSD 13, 3-38-20w4, ½ mile south of the discovery well, has indicated oil success in the D2 and D3 zones of Devonian. The well obtained about 100 ft. of D2 oil zone, set casing in top of D3, and is now continuing to core in that lower zone below 5,377 ft. After D3 has been fully penetrated the well will likely complete as a D3 oil well.

Gulf-C. P. R. 1 Havig, LSD 1, 9-38-20w4, ¼ mile east of the discovery well, is rigging up. Gulf's own rig will do the drilling at this test, and crew will likely commence operations with a day or two.

About 4½ miles southeast of the Stettler oil pool, Gulf is making hole below 4,265 ft. at an exploratory well. This venture, Gulf 14 H. W. Kerridge, is in LSD 14, 14-37-20w4.

Eighty-two wells were completed in the general Lloydminster area of Alberta and Saskatchewan during 1949. Seventy-two of the wells showed sufficient oil encouragement to rate setting production string of casing, 34 of which have been placed on production and the remaining 36 are still standing with casing set, awaiting further test. There were 11 wells abandoned and 1 that was unclassified.

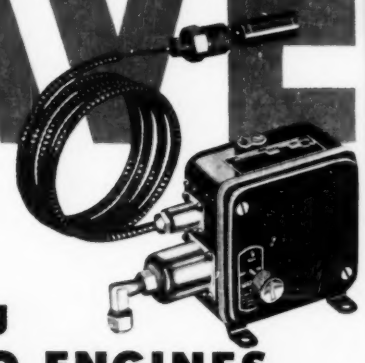
On the Alberta side, in the Blackfoot, Durness, Dina, and other areas, 23 wells ran production casing, 10 were placed on production, and 13 are awaiting test. Four wells were abandoned and one was unclassified, for a grand total of 28 Alberta completions in this region.

On the Saskatchewan side, in the Lloydminster, Dulwich, Lone Rock, Maidstone, Dina, and other areas, 54 wells were completed. Casing was set at 47 of the completions, while 24 of these were placed on production and 23 are still standing. Seven of the 1949 drillers on the Saskatchewan side failed to show oil encouragement and were abandoned.

During the last week 8 wells were completed in Alberta, to raise the total number of completions for the first 4 weeks of this year to 32. Seven of the new completions were successful field oil wells, while the other was a wildcat failure.

Five oil wells were placed on production in Redwater field this week. Imperial Oil, Ltd., accounted for 3 of the new wells, for a total of 7 new Redwater oil wells this year and a cumulative of 109 wells in that field since its discovery in September of 1948. Michel Oils, Ltd., of Winnipeg and British American Oil Co. successfully completed their first joint well on a Redwater Crown Reserve quarter section; and the Texaco Exploration - McColl Frontenac Oil

SAVE



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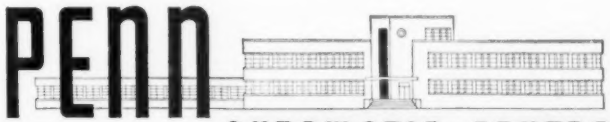

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Co. team started its twenty-second Redwater oil well in steady flow.

At Stettler, Canadian Gulf Oil Co. ran a potential test at its second successful oil well and received a substantial flow rate from the D3 horizon. At Leduc, the team of Hargal Oils, New Pacalta Oils, Lloyd-Leduc Oils, Granleduc, Freehold, and the Richardson Trust, placed its third Leduc oil well on production this week.

The team of Chief Redwater Oils, Alberta Oils Leaseholds, and Shaw Corp. Holdings, Ltd., abandoned its Eyot wildcat, located on the central Alberta plains, about 10¾ miles southeast of the Leduc oil field.

CANADIAN WILDCAT FAILURE

C. A. S. 1 Eyot, LSD 8, 16-48-25w4, TD 4,869 ft.

EASTERN CANADA

Gaspe.—In the Gaspe Peninsula of Quebec, I Continental-Gaspe on the Galt Block dome has been carrying on pressure and production tests following second acid treatment with 3,500 gal. at 927 ft. depth. Swabbing and bailing have been hampered by temperatures 10° to 28° below zero and the gas flow with accompanying fire hazard, which has necessitated restricting work to daylight hours. In the short production periods each day the well has yielded several barrels of high-gravity paraffin-base crude and relatively large quantities of natural gas, and a commercial producer is expected when 24-hour pressure and production tests can be started with milder weather. The 3 Venture and 1 Imperial-Gaspe are both shut in. The 1 Quebec Oil, on the Power-Joncas dome, is drilling below 348 ft. and expected to get the Continental-Gaspe producing horizon at 1,150 ft.

An 18-well drilling program is being undertaken by Gaspe Oil Ventures, Ltd., and associated interests. The program includes 11 wells on the Galt Brook dome, of which 10 will test the Continental-Gaspe No. 1 shallow producing horizon at 927 ft. One deep well will test an asphaltic-base crude horizon estimated around 6,000 ft. Four wells will be drilled on the Galt anticline, and three on three other structures. Operations will start in May.

LA.-ARK.

Bistineau Outpost Well Proves to Be a Gasser

SHREVEPORT.—Midstates Oil Corp. 1 S. L. Carter, NE SE 12-16n-10w, outpost test to Bistineau field of Bienville Parish, was dry at 6,997 ft., in the Travis Peak. Pettit porosity was logged from 5,382-5,492 ft., on elevation of 176 ft., and a drill-stem test of the section recovered 870 ft. of salt water with gas odor. Bottom-hole flowing pressure was 1,275 psi. Cores from 5,391-5,433 ft. recovered limestone, bleeding oil in spots. Final perforations at 6,286-96 ft. yielded salt water with a slight show of gas, then after 500-gal. acid treatment, flowed 1,220,000 cu. ft. of gas in 50 hours through 12/64-in. choke. Flowing pressures were 625 psi. on tubing and 600 psi. on casing.

Bert Fields 1 Thigpen-Herold, 23-16n-16w, Caddo Parish, was drilling below 6,625 ft., in the Travis Peak, and was to be carried to the Cotton Valley.

Gulf Refining Co. 1 Kinnebrew, 26-20n-7w, was coring in hard sandy shale at 10,380 ft., in the Cotton Valley.

H. L. Hunt 170-F Nebo, SE NE 33-7n-3e, Tuscaloosa test in West Catahoula field of LaSalle Parish, had total depth at 8,340 ft., in the Lower Cretaceous. Electrical surveys indicated no shows and it was to be plugged back for completion attempt in the upper zone.

Southwest Natural Gas Producing Co. 1 M. E. Colvin, 31-20n-2w, was in the Travis Peak, drilling below 6,272 ft. On elevation of 167 ft., it logged the Massive anhydrite from 3,850-4,070 ft., and top of the Pettit at 5,035 ft. No shows had been reported.

In Downsville field, Union Parish, Monla Gas Co., W. C. Feazel et al 1 Hinton-Allen, 9-19n-1e, was drilling below 9,189 ft., in the Cotton Valley, and was to be carried to the Smackover. A core from 8,342-53 ft. recovered 1½ ft. of shaly sand with gas odor and 7 ft. of shale.

NORTH LOUISIANA WILDCAT FAILURE

Caddo Parish: Gulf Refining Co. 1 H. H. Dixon, SE NW 34-21n-14w, dry, TD 3,005 ft., elevation 196 ft., Arkadelphia 828 Nacatoch 937 ft., Saratoga 1,373 ft., first Tokio 1,842 ft., Eagleford 2,200 ft., Paluxy 2,611 ft.

SOUTH LOUISIANA

New Oil-Producing Area Opened on Sabine River

NEW ORLEANS.—A new oil-producing area is being opened in Calcasieu Parish, just across the Sabine River from Orange, Tex., by Ohio Oil Co. 1 D. W. Brown, Jr. A spokesman for the firm said a "good showing of oil has been found at 8,015 ft." Another oil show at 7,666 ft. was indicated by electric log. The prospective discovery is approximately 5 miles northwest of Black Bayou and 6½ miles southwest of Vinton oil field. It is reported that no immediate attempt will be made to bring in the well at the present depth. It will be drilled down to contract depth of 10,000 ft. for experimental purposes.

Hassie Hunt Trustee has gaged the 1 S. W. Robison et al, gas-distillate discovery well for the Maxie area of Acadia Parish, for 39 bbl. of 52°-gravity distillate per day and 952,000 cu. ft. of gas, with flowing pressure on the tubing at 3,600 psi. The well is totaled at 11,400 ft. and is producing through perforations at 10,637-42 ft. through 8/64-in. choke. The well is located in Section 31-8s-1e, approximately ¾ mile south of Maxie townsite.

Shell Oil Co. is reported to have logged good showings of oil or gas-distillate in its 1 State Lease 1008, in the South Pass area, offshore from Plaquemines Parish, although no confirmation is available at this time. All information is being withheld until the well is completed. Hole is totaled at 10,020 ft. in shale and has a projected depth of 12,000 ft.

Meanwhile, in the Breton Sound area off Plaquemines Parish, Barnsdall Oil Co. has plugged and abandoned the 9 Breton-State Lease 1230 at 8,355 ft. At the same time, the company has been issued a permit for a new test in the same general area which will be the 10 State Lease 1504.

The 31 new locations in South Louisiana include 3 wildcat starts, 1 each in Cameron, Jefferson, and Plaquemines parishes. There were two successful exploratory tests completed, one each in Acadia and Plaquemines parishes, while two were dry, one each in Iberia and Plaquemines parishes.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Acadia Parish: New oil discovery—Ralph Lowe 1 Annie Laughline Young, 14-7s-1e, approximately 2 mi. S of Bayou Mallet production, top pay 8,904 ft., TD 9,122 ft., perf. 8,904-08 ft., IP: 110 bbl. oil per day, ⅛-in. choke, GOR 982, TP 1,100 psi., 37.4° gravity.

Plaquemines Parish: New pay at Quarantine Bay—Gulf Refining Co. 1 La. St. Lease 1349, top sand 10,037 ft., TD 10,745 ft., perf. 10,037-43 ft., IP: 198 bbl. oil per day, 5/32-in. choke, GOR 4,890, TP 2,900 psi., 38° gravity.

SOUTH LOUISIANA WILDCAT FAILURES

Iberia Parish: General American Oil Co.

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et al 1 E. R. Francois et al, Twp. 12s-7e, dry, TD 10,768 ft.

Plaquemines Parish: Barnsdall Oil Co. 9 Breton State 1,230, Block 36, in Breton Sound, State Lease 1,230, offshore, dry, TD 8,355 ft.

TEXAS GULF COAST

Gas Lift Being Tried on Chambers County Wildcat

HOUSTON.—Eastern States Petroleum Co. and associates have installed a gas lift on their Chambers County wildcat, the 1 W. F. Mayes et al, and are now trying to get a natural flow from the well. The venture is reported to be flowing 30 bbl. of oil per day. Production zone is not known, but operators are believed to have perforated around 7,900 ft. since several recent drill-stem tests at that level made a show of oil. Hole is totaled at 9,453 ft. and located southwest of Lost Lake in the E. Dorr Sur., A-74, 5 miles east of Wallisville.

In the Clay Creek area, Washington County, 12 miles north of Brenham, Alaska Steamship Co. et al 1 Ida Rosenbaum, Nestor Clay Survey, A-29, is credited with logging shows of oil in cores from 4,979 to 5,009 ft. Hole is bottomed at approximately 5,025 ft. and reports say that pipe is being set for completion attempt.

Hunt Oil Co. has reached a depth of 6,949 ft. in the 3 Dishman-Lucas, Jefferson County wildcat, and have been coring preparatory to drilling ahead to the 7,500-ft. projected depth. Core from 6,901-10 ft. recovered 3½ ft. of gray sticky shale; 4½ ft. of black sandy shale was recovered from 6,910-20 ft., from 6,920-30 ft. recovery was 2½ ft. of dark black brittle shale, and from 6,930-40 ft. recovery was 2 ft. of fine gray silty shale. The wildcat venture is in the vicinity of two other dusters.

Placid Oil Co. continues to drill in the 9 Roberts & Mueller, 11,000-ft. wildcat in High Island field, Galveston County. Operators are now making hole below 8 550 ft. The venture is in the John Grogan Survey, Abstract 104.

The 46 new locations in the Gulf Coast include 9 wildcat starts, 1 each in Austin, Brazoria, Ft. Bend, Hardin, Liberty, Matagorda, Newton, Live Oak, and Victoria counties. There was one successful exploratory test completed in Lava County, while five were dry, one each in Bee, Jackson, Jefferson, Liberty, and Wharton counties.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCAT

Lavaca County: New oil pool in Ezzell area—The Texas Co. A-3 Cora Russek NCT-1, 5 mi. NE of Hope gas field, Joshua C. Reynolds Sur., 13 mi. SE of Sweet Home, top sand 5,284 (Yegua), TD 10,224 ft., perf. 5,284-90 ft., IP: 136 bbl. oil per day, 9/16-in. choke, GOR 686, TP 725 psi., casing sealed, 42.2° gravity.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

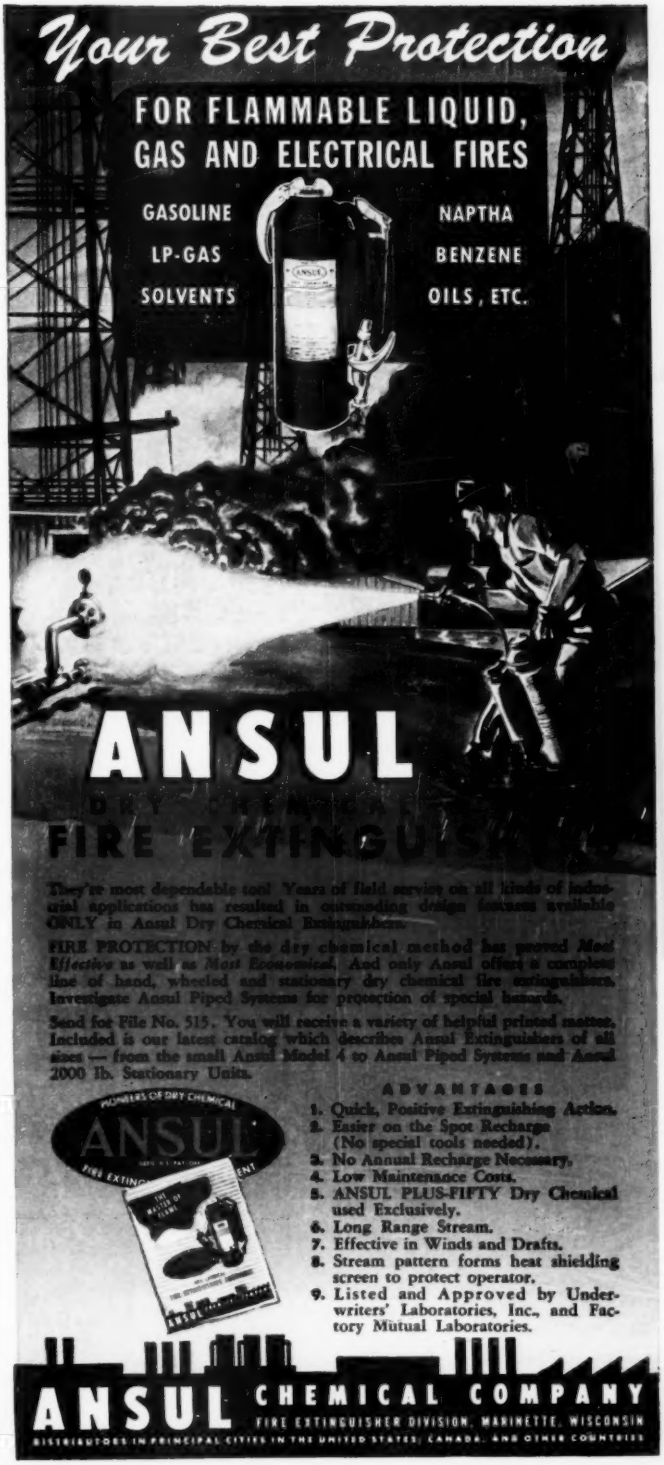
Bee County: Orlee Oil Co. 2 M. J. White, Refugio County School Land Sur. A-284, 1½ mi. SW of Tynan field, dry, TD 3,003 ft.

Jackson County: Alcoa Mining Co. & Crown Central Petroleum Corp. 1 Mrs. Cornelia Ward Parfit, Nancy A. McFarland Sur., 699 ft. N of shoreline of Carancahau Bay, 8 mi. S-SE of La-Ward, dry, TD 9,284 ft.

Jefferson County: Lamar Hunt Trust Estate 1 Broussard Trust, S. China area, W. Clippinger Sur., 3 mi. SE of China, dry, TD 9,010 ft.

Liberty County: Skelly Oil Co. 1 R. H. Bosworth, Beasley Pruitt Sur., 3 mi. NW of Dayton townsite, dry, TD 9,170 ft.

Wharton County: Wesley West 1 Emily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Childs, Napoleon B. Williams League, 1½ mi. SE of Lane City, dry, TD 7,516 ft.

SOUTHWEST TEXAS

Deep Aransas County Wildcat Being Tested

CORPUS CHRISTI—Union Producing Co. 1 Virginia Tatton, closely watched deep wildcat discovery prospect in Aransas County, perforated casing at 11,398-408 ft. and ran a 4-hour and 20-minute drill-stem test through ¼-in. chokes. Recovery was approximately 4,900 ft. of oil and fresh water and 4,000 ft. of fresh water. The well is still testing in this section. Hole was drilled to a total depth of 11,519 ft. and liner was run to bottom for testing operations.

The well, which lies 4 miles north of Lamar field and 4 miles southwest of St. Charles gas-condensate field, previously tested oil from open hole below the 7-in. casing, at 10,228-523 ft., recovering 15 stands of oil and 10 stands of mud from this section with the tool open 2 hours and 8 minutes. The well is reported to have cored an oil sand at 10,945-11,000 ft., but no test was reported made on this section.

Another prospecuve discovery in Southwest Texas is the James G. McCarrick, Trustee, 1 George H. Frazer Unit, which recovered 1,120 ft. of pipe-line oil and developed 200 psi. flowing pressure on 12½-minute drill-stem test made at 6,110-19 ft. Prior to running the test, the Nueces County wildcat was cored from 6,880-85 ft., recovering 5 ft. of shale; from 6,885-90 ft. recovering 3½ ft. of shale; from 6,890-95 ft. recovering 3 ft. of shale; from 6,895-903 ft. recovering 5 ft. of shale and from 6,902-11 ft. recovering 4 ft. of shale and 1 ft. of sand with good oil odor and show. The well is located in Block 19 of the Russell Farm blocks.

H. A. Pagenkopf of San Antonio is completing the 1 Edwin J. Haby for an oil discovery 5½ miles southwest of Dunlay in Medina County. The well was drilled to a depth of 1,270 ft. and plugged back to 592 ft. Operators set 5-in. production casing to 570 ft. and acidized with 500 gal. of acid in open hole from 570-92 ft. in the Escondido formation. The well flowed 25 bbl. of oil in 19 hours.

The 42 new locations include 11 wildcat starts, 1 each in Bell, Brooks, Duval, Jim Wells, Starr, and Webb counties, and 5 in Nueces County. There were no successful wildcats reported. However, six were dry, one each in Guadalupe, Aransas, Webb, and Zapata counties and two in Cameron County.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Aransas County: George W. Graham & Emory M. Spencer 1 Peden Iron & Steel Co., John Smith Sur., A-137, 3½ mi. W of Rockport, dry, TD 8,154 ft.

Cameron County: Danciger Oil & Refining Co. & Curtis Singleton Drilling Co. 1 G. J. Weikel, Espiritu Santa Grant, Share 22, 4 mi. N of Los Fresnos, dry, TD 10,021 ft.

Stanolind Oil & Gas Co. & Curtis Singleton Drilling Co. 1 Prilla A. Ashcraft, CCSD&RGNG Sur. 283, 3 mi. E-NE of Harlingen, dry, TD 8,610 ft.

Guadalupe County: Morris Cannan 1 Louis Koepp, Vicente Duran Sur., approximately 2 mi. W of New Berlin, dry, TD 1,559 ft.

Webb County: Killamand Anderson 1 Servando Benavides Estate, Sur. 694, 4½ mi. N of Bruni, dry, TD 2,945 ft.

Zapata County: Sid Katz 2 F. G. Trevino et al, El Grullo Grant, 6 mi. N of Charco Redondo, dry, TD 1,326 ft.

APPALACHIAN FIELD

Good Oriskany Gas Strike in Hancock County

PITTSBURGH—An Oriskany wildcat test was completed in Clay District, Hancock County, West Virginia, John T. Galey No. 1 Karol and Catherine Sobel, at a depth of 4,772 ft., with gas gaging 1,700,000 cu. ft. at 4,756 ft. The top of the Oriskany sand in this well was at 4,754 ft. The initial rock pressure was 1,750 psi. In Tucker District, Wirt County, Glen W. Roberts has located No. 1 H. W. Stephens, elevation 1,070 ft., in this field's Oriskany development. It is on the Belleville Quadrangle 2.25 miles south of Latitude 39 degrees, 05 minutes and 2.75 miles west of Longitude 81 degrees, 30 minutes.

New locations reported in West Virginia were eight: Center and Lee Districts, Calhoun County; Center and DeKalb Districts, Gilmer County; Elk District, Kanawha County; Centerville District, Tyler County; Church District, Wetzel County; and Tucker District, Wirt County.

In Wharton Township, Fayette County, Pennsylvania, William E. Snee et al, No. 3 Indian Creek Coal & Coke Co., elevation 2,615 ft., topped the Oriskany sand at approximately 7,306 ft. Operations are shut down at 7,311 ft. for repairs to the tools. Georges Township, Orville Eberly et al, No. 1 N. E. Murphy, elevation 2,500 ft., recorded the Brown shale at 6,830 ft. to 7,212 ft., Tully lime 7,212 ft. and still drilling in this formation at 7,279 ft. In Washington Township, Greene County, Young & Glass et al, completed No. 1 L. P. Shipman, gaging 1,500,000 cu. ft. of gas, top of Fifty-Foot sand 2,854 ft., gas 2,914 ft. to 2,920 ft., total depth 2,920 ft.

New locations reported in Southwest

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Foreign	D. T. O'Connor, 500 Fifth Avenue, New York, N. Y. Petroleum Industry Consultants, C.A., Caracas, Venez. Denton-Spencer Co., Ltd., Calgary, Alberta, Canada.	

Pennsylvania were six: Mahoning and South Buffalo townships, Armstrong County; Buffalo Township, Butler County; and Beaver Township, Jefferson County.

WEST VIRGINIA SUCCESSFUL WILDCAT

Hancock County, Clay District: John T. Galey, No. 1 Karol and Catherine Sobel, elevation 1,066 ft., 1,700,000 cu. ft. of gas; Oriskany sand 4,754 ft., gas 4,756 ft., rock pressure 1,750 psi., TD 4,772 ft.

OKLAHOMA

Woodward Wildcat Finds Showings of Oil and Gas

CORING ahead through lower Pennsylvanian section, Carter Oil Co. is encountering additional showings of oil and gas in its 1 Frank Harrison, NE SE NE 7-23n-20w, rank wildcat test 6 miles north of Woodward in northwestern Woodward County. Latest reported drill-stem test was in a sand at 7,721-87 ft. In this, gas showed within 20 minutes after the testing tool was opened in a 2-hour run and flowed at an estimated rate of 30,000 cu. ft. per day with a pressure of 80 psi. Fluid recovery was 170 ft. of slightly oil-cut mud. With the well shut in, the pressure built up to 380 psi. in 25 minutes. This sand is believed to be the equivalent of the Manning pay zone in the rapidly expanding Ringwood pool in adjoining Major County.

Previously, drill-stem tests had been made in sands at 6,872-6,972 ft. and at 4,175-4,221 ft. In the former, some free oil, along with 310 ft. of mud and 90 ft. of gas cut, was recovered. In the latter, 180 ft. of oil and gas-cut mud, along with 820 ft. of mud and salt water, was recovered.

Herman Brown appears to have a well in his 1 Seiter, NW NW SW 29-10n-2w, 5 miles south of Moore, Cleveland County. The location is midway between the South Moore pool on the west and the Moore field proper on the east. Although information is being withheld, separators and tanks are being set up. The well is testing what is indicated to be the second Wilcox sand with a possible 50 to 65 ft. of saturation. It is reported to have flowed initially from 1,000,000 to 2,000,000 cu. ft. of gas per day with a spray of oil. After being shut in for a time, it flowed, according to observers, about 6 to 8 bbl. of oil per day through a small choke. Later, production was estimated at 160 bbl. of oil per day through ¼-in. choke. Indicated total depth is approximately 7,400 ft. with the pay starting around 7,350 ft.

Sun Drilling Co. 1 Seay, NE SE SE 22-6s-5w, prospective new pool-opener in Jefferson County, in the southern part of the state, had a 1,250-ft. oil fill-up after drilling plug to test sand at 2,514-68 ft. Some water was indicated, and casing has been recemented in an effort to correct the trouble before further testing. The location is just west of Grady and about 2¾ miles east of the Spring pool, nearest production.

OKLAHOMA SUCCESSFUL WILDCATS

Logan County: Alpha Petroleum Co. and Jordan 1 Hargrove, NE SE NE 1-16n-1w, new pay in South Langston pool, flowed 200 bbl. through 7 16-in. choke from Misc at 5,072-92 ft., gravity 43°, TD 5,092 ft.

Major County: Mazda Petroleum Co. 1 Johnson, NE NW SW 3-21n-10w, flowed 156 bbl. through 12 16-in. choke, Manning, 6,778-6,879 ft., TD 6,942 ft.

McClain County: Republic Natural Gas Co. 1-X Harris, 660 ft. S and 760 ft. E SE NW 34-5n-4w, flowed 425 bbl. of 44.4° oil through ¼-in. choke from Bromide, 10,878-11,025 ft., TD 11,212 ft.

OKLAHOMA WILDCAT FAILURES

Carter County: Samedan 2 Frensley, NE NW NE 25-2s-1e, dry, TD 5,243 ft.

Comanche County: Lotfland 1 Ray, SW SW NE 22-1n-10w, dry, TD 2,502 ft.
Reding 1 Japp, NW NW SE 10-1n-11w, dry, TD 290 ft.
Alexander & Pollard 1 Ambrose, NE SE NE 9-2n-10w, dry, TD 410 ft.

Creek County: Deep Rock Oil Co. 6 Jones, SW SW NE 31-18n-7e, dry, TD 3,237 ft.

Jefferson County: Jones 9 Blake, NE SW SW 16-1s-8w, dry, TD 4,214 ft.

Kiowa County: Collins 1 Oster, SW NE NW 33-7n-17w, dry, TD 897 ft.

Lincoln County: Kemp & Gillespie 1 Parker, SE SE SW 20-16n-4e, dry, TD 4,416 ft.

Logan County: Birmingham & Bartlett 1 Walker, NE SE SE 9-16n-1e, dry, TD 5,489 ft.

McIntosh County: Pine 1 Nix, SW NW SW 9-10n-13e, dry, TD 3,327 ft.

Okfuskee County: Manhart 1 Marjo, SE NE NE 19-12n-11e, dry, TD 3,703 ft.

Pawnee County: Davon, Hanlon & Boyle 1 Little Crow, SW SE SW 17-23n-3e, dry, TD 4,236 ft.

Pottawatomie County: Vaughn & Tilley 1 LaReau, SE SE NE 19-6n-3e, dry, TD 3,214 ft.

Stephens County: Davis 4 McKinley, NW SW NW 34-2s-6w, dry, TD 2,529 ft.
Palmer 1 Leard, SE NE NW 31-2n-5w, dry, TD 10,082 ft.

ROCKY MOUNTAIN

Church Buttes Deep Test Proves Failure in Nugget

DENVER.—Failure in the Nugget at Mountain Fuel Supply Co.'s first well below the Morrison in Church Buttes field is a disappointment for future deep drilling in the western Green River Basin area of Wyoming. This well is 7 Unit, C SW

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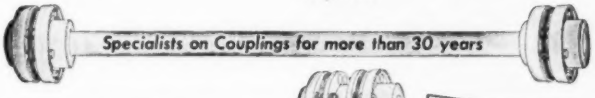

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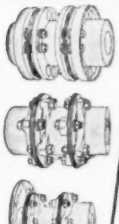

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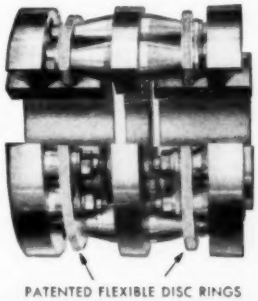

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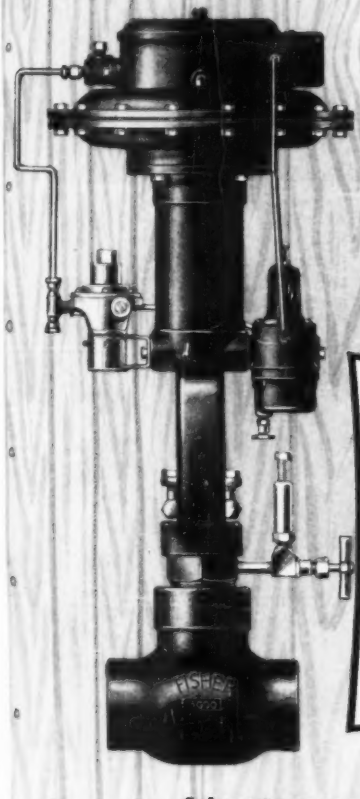

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MARSHALLTOWN, IOWA

NW 17-18n-112w, and it was drilled to 14,646 ft., total depth. On drill-stem test in the Nugget between 14,526-14,646 ft. the operator reported considerable salt water but no gas. The well is being plugged back for completion in Dakota, the producing zone in other wells completed on the structure.

Mountain Fuel made its Dakota sand gas discovery in 1946, at depths below 12,000 ft., and has now completed five producing wells in the field. Gas from the field is sold in Mountain Fuel's utility system in the Salt Lake City-Ogden area. Failure of the Nugget sand test at Church Buttes may mean that Stanolind Oil & Gas Co.'s deep test at Canyon Creek, 75 miles southeast in Sweetwater County, Wyoming, may not be deepened below its 13,321-ft. depth where the well was temporarily abandoned after failing to find production in Dakota sand.

Recovery of oil on drill-stem test in the Shannon sand by Continental Oil Co. at its 1 Unit, NE NE NW 11-41n-78w, Meadow Creek wildcat, Wyoming, indicates a fourth pool in the general Sussex area. The well made 330 ft. of oil with 1,000,000 cu. ft. of gas on 35-minute drill-stem test between 5,137-70 ft., with Shannon topped at 4,089 ft. An upper Shannon zone was hard and tight, and the producing zone followed a shale break below this section. This wildcat is on a unitized block 4 miles south of Continental's East Sussex pool, where production is from Lakota sand, and 2 miles south of a recent discovery by Delhi Oil Corp. in the North Meadow Creek area. Continental is drilling ahead at the Meadow Creek wildcat and will probably test Lakota prior to completion of the well. Delhi now has two rigs running in the North Meadow Creek area, and Continental five in the Sussex area.

Although the three operations now drilling in the new Glenrock area, Converse County, Wyoming, are tight holes, it is rumored that shows were logged in the Wall Creek sands at the Phillips Petroleum Co. 1 Brubaker, SW SW SW 33-34n-75w, a southeast extension to the Muddy sand discovery well. The well is now below 6,411 ft., headed for the Muddy which was found at 7,202 ft. in the Steelco Drilling Co. discovery well. No tests were reported in the Wall Creek sands at the Phillips well but shows in that formation would be of interest due to the similar section drilled in the Steelco well. Steelco, a Chicago firm headed by Jack Steele, is now drilling below 5,463 ft. at its 1 Moore, SW SW NE 34-35n-75w, and below 4,900 ft. at the third well at 1 Robbins, SW SE SW 33-34n-75w. Both are presently carried as tight holes, with no release of formation tops or testing data.

New locations.—There were six new locations during the week, with five in Wyoming and one in western Nebraska. In Wyoming, Markley-Snyder-Case et al are preparing to spud at 1 State, C SW NW 36-43n-65w, a wildcat in the Clareton area, Weston County. Ohio has spudded 1 Gurschke, SW NE SE 3-14n-50w, its third well in the new Huntsman gas area, Cheyenne County, Nebraska.

Completions.—Fourteen wells were completed, with 12 in Wyoming, 1 in Utah and 1 in northern New Mexico. In Wyoming, Keniland Oil & Gas Co. plugged its East Salt Creek wildcat at 7,902 ft., total depth, after finding shows in Sussex sand, Muddy, and Wall Creek sands. It is possible the company may drill another test in this area. In Utah, Grand River Oil & Gas Co. plugged its Castle Creek wildcat at 3,711 ft., total depth, with Rico topped at 1,737 ft.

WYOMING WILDCAT FAILURE

East Salt Creek, Natrona County: Keniland Oil & Gas Co. 1 Isbrantsen-Govt., SE SE SE 15-40n-78w, 7,902 TD, abnd., Mesa Verde 1,030, Steele Shale 1,900, Sussex 2,480-2,508, Shannon 2,980-3,060, Stray sand 3,244-94, Stray sand 3,380-3,420, Niobrara 4,350, Carlisle 4,760, Frontier 4,970, first Wall Creek 4,970-5,044, second Wall Creek 5,354-5,442, third Wall Creek 5,698-6,794, Mowry 5,868, Thermopolis 6,098, Muddy 6,118-36, Dakota 6,278-6,322, Fuson 6,322, La-

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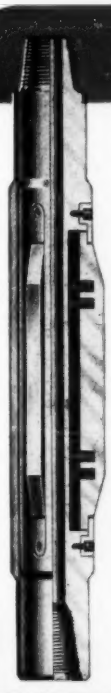

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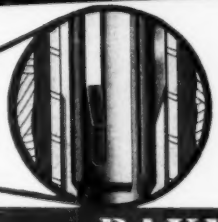

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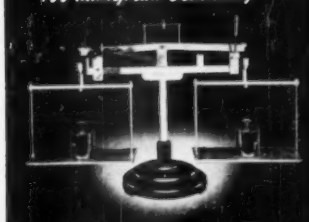

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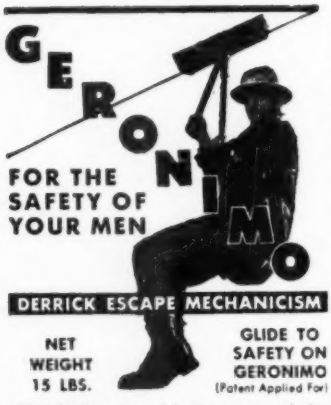

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UTAH WILDCAT FAILURE

Castle Creek, Grand County: Grand River Oil & Gas Co. 1 State, SW NW NE 36-24s-22e, 3,711 TD; abnd., Rico 1,737.

EASTERN TEXAS

Fast Drilling Due In Anderson County Area

DALLAS.—Additional drilling has been slated for the Tennessee Colony area of Anderson County, where Continental Oil Co. 1 Royal National Bank discovered oil in the upper Rodessa section and gas-distillate in the lower Rodessa. C. Andrade III Dallas operator, had surface pipe set and was drilling ahead at 1 Mary W. Hopkins, located on a 1-acre tract in the A. G. Monroe Survey, some 800 ft. north of the field discovery. The Texas Co. was reported moving in rig and materials for its 1 S. C. Avant, located 1,000 ft. to the northwest of the discovery. Seven other tests were reported staked on small tracts in the vicinity, while the independent operators are either waiting on action on their Rule 37 applications of for a Texas Railroad Commission decision concerning spacing and field allowables. Operators reported waiting to drill included Investment Credit Co. and J. Livingston, Waco; J. H. Jukes of Dallas, G. W. Keeling of Palestine and Hoy Owen of Houston.

Continental made a new potential test of the discovery well which resulted in a new allowable of the upper Rodessa zone of 131 bbl. of oil a day. Original completion was 108.5 bbl. a day, through ½-in. choke, from perforations at 8,865-85 ft. Continental has also asked for dual discovery allowable from both zones of the Rodessa. The lower zone has produced 2,800,000 cu. ft. of gas a day, open flow, plus 136 bbl. of 57° gravity distillate per 1,000,000 cu. ft., from porosity at 8,965-90 ft. At a Railroad Commission hearing in Austin 2 weeks ago, other operators contended the lower Rodessa reservoir should not be classified as either an oil or gas zone until further testing has been done in the area.

Three miles west of Crow in Wood County, F. R. Jackson 1 Harrell, William Wallace Survey, A-648, was drilling below 5,600 ft., on a 7,500-ft. contract. According to field sources, the location is in a trough along the northern edge of the Sabine Uplift and the Woodbine section is expected to be considerably lower than others in the region.

A Woodbine wildcat on the J. B. Knight land just west of the Trinity River and 8 miles east of the Oakwood townsite, in Leon County, originally planned by Ralph Spence of Tyler, has been taken over by Danciger Oil & Refining Co., it was said. Danciger was reported building roads to the project and will drill to around 5,800 ft. Location is in the Simon Sanchez Survey, A-25, on a 1,000-acre farmout from Atlantic Refining Co. Companies supporting the test included American Liberty Oil Co., Tex-Harvey Oil Co., Magnolia Petroleum Co., Sohio Petroleum Co. and Carter-Gragg Oil Co.

Sells Petroleum Co. was making plans to deepen its 1 Oliver Hackett, Samuel Leeper Survey, A-359, Smith County wildcat which last year was dry at 7,615 ft. in the upper Glen Rose. According to reports, it would be drilled to the Rodessa, producing formation of the Red Springs field, 1½ miles to the northeast.

EAST TEXAS (DISTRICTS 5, 6, AND 6-P) SUCCESSFUL WILDCAT

Harrison County: LaGloria Corp. and Arkansas Fuel Oil Co. 1 Minnie B. Downs, Edwin Cater Sur., A-165, 2½ mi. NE Elysian Fields, TD 6,400 ft., elevation 366 ft., perforated the Travis Peak with 92 shots 6,223-46 ft., 60 shots 6,313-27 ft., IP flowed 8,420,000 cu. ft. gas a day, open flow, plus ungaged amount of distillate; on ¾-in. choke registerd 1,412 psi. tubing pressure, 1,593 psi. casing pressure.

EAST TEXAS (DISTRICTS 5, 6, AND 6-P) WILDCAT FAILURES

McLennan County: Daniel Oil Co., Inc., 1 Elizabeth W. Estes, D. Gaulkner Sur., near Lorena, dry, TD 2,671 ft.

Panola County: Leonard Culbertson 1 W. H. Carter, Samuel Bowers Sur., 7 mi. W Beckville, dry, TD 6,908 ft., elevation 382 ft., no tops reported.

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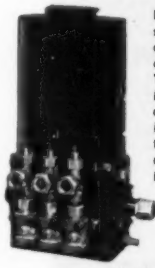

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OHIO, KENTUCKY

Probable Pool Opener Will Be Shot for Tests

COLUMBUS.—Roy Stewart et al 1 A. C. Wengerd, Section 16, Prairie Township, Holmes County, topped the lower Clinton at 3,329 ft. and was drilled to 3,343 ft. where it gaged 1,380,000 cu. ft. natural. This is probably a pool opener north of and adjoining the old Millersburg oil field. The well will be shot before completion.

Jas. A. Upham 1 Samuel Moore, Section 2, Goshen Township, Tuscarawas County, an east extension to the Fairfield pool, found the red Clinton at 5,090-5,138 ft. with 20,000 cu. ft. and the white at 5,138-60 ft. with 410,000 cu. ft. The well was completed natural.

C. H. & D. Co. 2 Bert Clouse, Section 33, Hopewell Township, Perry County, drilled the Clinton at 2,950-93 ft. with 350,000 cu. ft., and a good showing of oil natural. The well will be shot and tubed.

Dr. Newhall 1 E. C. Baker, Lot 99, Harrisville Township, Medina County, ½ mile south of the other recent drilling, showed 206,000 cu. ft. in the upper Clinton at 2,762-70 ft. which shut in at 380,000 cu. ft. after shot.

Perry County remains active with 6 out of the 16 locations reported for the week, while Tuscarawas had 2 of the remaining 10. Cambridge and Ashland fields each had 5 completions out of a total of 17.

EASTERN KENTUCKY

ASHLAND.—In Big Sandy gas field located in extreme eastern Kentucky recent completions by Kentucky West Virginia Gas Co. were as follows: 5883 Noah Newsom, Pike County, 450,000 cu. ft. of gas daily from Devonian black shale at total depth 3,429 ft.; 5900 Reuben Little, Pike County, 152,000 cu. ft. gas daily from Devonian shale at 3,867 ft., total depth; 5906 W. J. Johnson, Floyd County, dry and abandoned at total depth 3,661 ft. in Devonian shale.

In the old Ida May pool of southern Lee County, Douglas Parrish, Jr., et al are drilling at 1,200 ft. in Devonian black shale and looking for top of Corniferous at 15 Dave Mays. Lease is located in the north end of the field.

In Knox County, 17-D-68 Triangle Oil & Gas Co. is making hole below 4,100 ft. at 1 Stafford, an old well formerly bottomed at 2,115 ft. and now being deepened to test possible pays at greater depths. This makes only the second test for the county to drill below the 4,000-ft. depth.

WESTERN KENTUCKY

OWENSBORO.—Proving up the area between Glenville and Guffie along the McLean-Henderson County line continues fairly active with two additional wells, both on the McLean County side, being completed. Miller-Shiarella and Ashland Oil & Refining Co. 1 Robertson, 17-N-28, on the west side of Glenville pool, pumped 100 bbl. of oil per day at completion in Bethel sand at 1,699-1,712 ft., shot with 60 qt. of nitro. Less than a mile further west, on the east side of the Guffie pool, the same operators completed their 9 Whit-Mark Wright, 16-N-28, pumping 20 bbl. of oil per day from Jackson sand at 1,895-1,901 ft., shot with 40 qt.

Great Lakes Carbon Co. completed another good producer in the Pellville pool, Daviess County. Its M-14 Anna Pettit, 25-P-33, pumped 50 bbl. of oil per day natural from McClosky lime at 990-98 ft.

WESTERN KENTUCKY WILDCAT FAILURE

Webster County: Ryan Oil Co. 1 Frazier, SW SE NE 16-N-24, dry, TD 2,774 ft.

INDIANA

EVANSVILLE.—Confirmation of Aux Vases production in the new King pool, Gibson County, has been given by the completion by Evans & Dobbs of their 3 Laura Woods, SW SE SE 21-12s-11w. An east offset to 1 Laura Woods, Aux Vases discovery well, and a northeast diagonal offset to the pool's discovery well, completed last August in Bethel sand, the new producer pumped 40 bbl. of oil per day with the pay at 2,228-34 ft., about 5 ft. higher than in the first well in this pay.

The same operators also got a second well in the pool's discovery pay zone with the completion of their 2 Laura Woods, NW SE SE 21-2s-11w, north offset to the new Aux Vases well, which pumped 45 bbl. of oil per day with pay at 2,110-16 ft. Location of this well is about ¼ mile north of the pool's discovery well. The two latest completions make a total of four producers for the pool, opened last August.

The recently opened Pelzer pool, in Warrick County, is adding another producer, the fifth, at V-T Drilling Co. 1 Minnie Addington, NE SE NE 22-6s-8w, west offset to the same operators' 1 Helm-Stith, which, in turn, was a north offset to the discovery well. Testing the pool's Cypress sand pay zone at 1,550-59 ft., it swabbed 15 bbl. of oil with about 24 bbl. of water per day.

Joe Resnick 1 Butler, NE SW NE 15-4s-10w, southern Gibson County, near the Vanderburg County line, is cleaning out following a 30-qt. nitro shot to test showing encountered in Jackson sand at 1,800-09 ft. It is about 3½ miles northeast of Stacer and about 2½ miles east of Warrenton pool, nearest production.

INDIANA SUCCESSFUL WILDCAT

Daviess County: National Associated Petroleum Co. 1 L. Meurer, SE SW NE 2-4n-7w, IP 235 bbl., McClosky 742-47 ft., TD 749 ft. (Discovery well Plainville pool).

INDIANA WILDCAT FAILURE

Gibson County: Aurora Gasoline Co. 1

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Lamey, NW NE SW 12-4s-11w, dry, TD 2,480 ft.

KANSAS

Stafford County Wildcat Makes Arbuckle Pumper

AS the discovery well of a new pool located $2\frac{1}{2}$ miles southwest of the St. John pool, in southern Stafford County, L. B. Stableford 1 Harter, NE NE SW 30-24-13, has been placed on the pump, making 83 bbl. of oil in the first 23 hours and 66 bbl. in the next 22 hours. Production is from Simpson sand, in which casing was perforated at 4,167-71 ft. Hole first was drilled to the Arbuckle which failed to show for commercial production. Arbuckle was topped at 4,205 ft. and perforated 45 ft. Casing was run to the top of the latter section.

Derby Oil Co. and associates 1 Balthazor, NW NW SE 13-9-21, discovery well of the East Morel pool, located $\frac{3}{4}$ mile east of the Morel pool, on the eastern edge of Graham County, has been completed with the maximum potential rating of 3,000 bbl. per day. Production is from the Arbuckle lime, topped at 3,729 ft. (—1,528 ft.) and drilled to 3,733 ft. with casing run 1 ft. in the top. A north offset, D. G. Hanson 2 Eichman, SW SW NE 13-9-21, has found the Arbuckle 5 ft. higher than in the discovery well and is preparing to test with indications of making a good producer. The top was 3,697 ft. (—1,535 ft.).

Petroleum, Inc. 1 Froelich, SE SE SW 22-12-46, Ellis County, discovery well of the Christina pool, pumped at the rate of 195 bbl. daily on potential test. Its pay zone is the Lansing lime, topped at 3,194 ft. (—1,211 ft.), and in which casing was perforated at 3,278-84 ft. Hole has been plugged back to 3,320 ft. from a total depth of 3,495 ft. in Arbuckle lime, topped at 3,467 ft. (—1,479 ft.).

A $\frac{3}{4}$-mile southeastward extension of the Claussen pool, Russell County, or a possible new pool, is indicated at Prairie Oil Well Drillers 2 McCormick, NW NW NW 35-12-14, in which hole filled 1,200 ft. with oil. Total depth is 2,805 ft. in Lansing lime, topped at 2,730 ft.

ILLINOIS

Saline County Wildcat Opens McClosky Pool

MATTOON—W. O. Morgan 1 Cole, NE NE SE 20-7s-6e, which opens a rank wildcat pool in northern Saline County, just south of the Hamilton County line, has been put on the pump after preliminary swabbing and flowing tests of McClosky lime, in which casing was perforated at 3,191-95 ft. Initially, it made approximately 225 bbl. of oil with about 5 bbl. of water per day, but production has dropped to about 50 bbl. of oil with 7 bbl. of water daily.

The location is just north of the small Long Branch townsite and about 5 miles northeast of Galatia. Nearest production is in the West End pool, about $4\frac{1}{2}$ miles to the west. This is an old hole, drilled in 1947, and formerly was abandoned as dry. Total depth is 3,264 ft. with $5\frac{1}{2}$-in. casing at 3,242 ft. Pay has not been acidized.

Robinson-Puckett, Inc., 1 Manahan, SW NW NE 23-1s-6e, located in the area between the south ends of the Johnsonville Consolidated pool to the west and the Clay City-Noble Consolidated pool to the east, and about a mile from production in either, made 145 bbl. daily in preliminary swabbing tests while testing McClosky lime at 3,187-97 ft. Later, it swabbed at the rate of about 100 bbl. daily. Preparations are being made to put it on the pump.

A. C. Davis and R. P. Johnson 1 Moore, NE NE SE 12-2n-10e, which opens another producing area located 2 miles north of Calhoun and $2\frac{1}{2}$ miles from nearest production of the Parkersburg Consolidated pool, in Richland County, pumped 210 bbl. of oil per day at completion. Pay zone is McClosky lime at 3,272-77 ft. Wiser Oil Co. 1 Fred Slunaker, SW SW NW 7-2n-11e, $\frac{1}{2}$ mile south of the above well, is being put on the pump after swabbing tests, in which it made 71 bbl. of oil and 135 bbl. of water in one 16-hour test. The latter's 2 Slunaker, SW N$\frac{1}{2}$ SW 7-2n-11e, south of No. 1, is testing the pay at 3,261-66 ft., as is The Texas Co. 1 Grover, SW SW SE 6-2n-11e, $\frac{1}{2}$ mile east of the discovery well, which has the pay at 3,278-80 ft.

ILLINOIS WILDCAT FAILURES

Clark County: J. W. Rudy 1 Kine, SW SW NW 36-11n-11w, dry, TD 2,283 ft.

Clinton County: P. Doran 1 Hemminghaust, SW NE NE 1-2n-1w, dry, TD 1,555 ft.

G. L. Reasor 1 Davis, SE SE NE 4-2n-2w, dry, TD 2,660 ft.

Coles County: J. C. Pulliam 1-A Cashat, SE NE SE 24-12n-8e, dry, TD 1,050 ft.

J. Lickwald 1 Winkleblack, NW NE NE 14-12n-10e, dry, TD 765 ft.

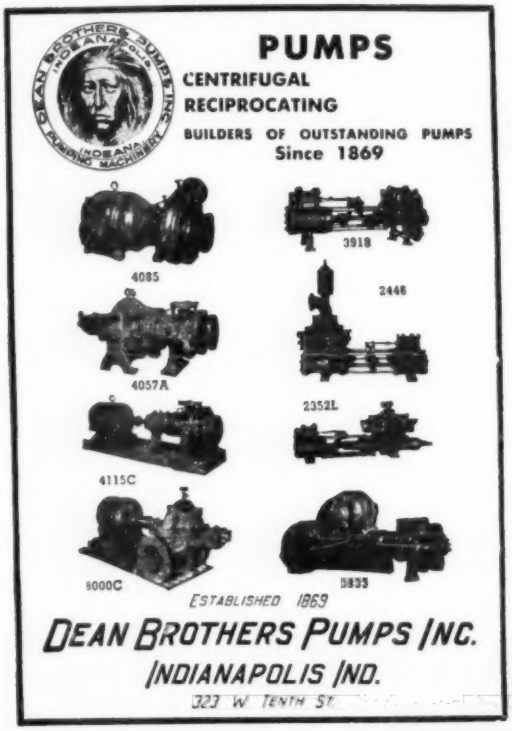
Edgar County: Siemuker & McClintock 1 Baum, SW SW NW 12-16n-14w, dry, TD 407 ft.

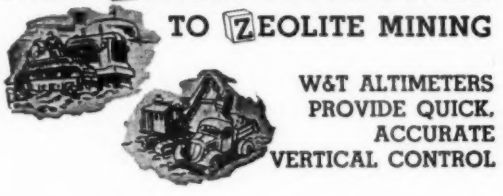
C. E. Hair 1 Crawford, SW SE SW 36-15n-14w, dry, TD 456 ft.

Cookseri & English 1 Dickson, SE SE NE 7-12n-11w, dry, TD 1,130 ft.

Effingham County: Jones & Simpson 1 McVickers, NW NW NE 31-8n-4e, dry, TD 1,650 ft.

Jefferson County: Nation Oil Co. 1 Cherry

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Lawrence County: John Zanetis 1 Bass et al., NE SE NE 12-2n-13w, dry, TD 1,689 ft.

Wabash County: Wiser Oil Co. 1 Bosecker, NE NW SE 24-2s-14w, dry, TD 2,872 ft.

PERMIAN BASIN

Scurry Extension Well Makes Good Flow on Test

MIDLAND. — William Hamm, Jr., and Jones & Simpson Drilling Co. 1 Dee Myers, SE SW 244-97-H&TC, semiwildcat about 1½ miles north of production in the Diamond M field, made completion potential of 1,080 bbl. of oil a day, flowing through ¾-in. choke from casing perforations at 6,820-40 ft., plus 3 ft. of open hole below casing at 6,848 ft. Potential was based on a 6-hour flow of 270 bbl. of oil. On elevation of 2,433 ft., top of reef was 6,765 ft.

Tide Water Associated Oil Co. staked a south offset to the 1 Myers, as the 1 T. W. Pollard, 467 ft. from north and east lines, northwest quarter, Section 214, Ted Weiner 1 Moore Creek Missionary Baptist Church, 246-97-H&TC, 1 mile northwest of production, was trying to shut off water. Cement plug was set at 6,830 ft. Spartan Drilling Co. 1 J. H. Langford, 240-97-H&TC, wildcat 3½ miles northwest of the Diamond M field, was reported preparing to drill ahead. On elevation of 2,403 ft., it topped the reef at 7,066 ft. A drill-stem test from 8,048-60 ft., open 40 minutes, produced a slight blow for 5 minutes, and recovered 540 ft. of water blanket and 40 ft. of mud with a rainbow show of oil. Core recovery from 8,050-60 ft. was chert and green shale.

In northeastern Scurry County, M. E. Davis and J. Conley Miles 1-A John J. Schattel, NW NW 90-2-H&TC, Ellenburger prospect, drilled out to 7,765 ft., pulled and reran tubing and was testing. It pumped 65 bbl. of oil in 11 hours. Gene Goff 1 Joe Rylander, 124-3-H&GN, northeast of the Snyder townsite, was last reported swabbing from 6-8 bbl. of oil an hour, down from earlier tests of 12-13 bbl. hourly, from the Strawn. Total depth was 7,193 ft.

Midland County.—Standard-Fryer Dilling Co. et al 1 Andrew Fasken, 7-36-T2S-T&P, Spraberry sand discovery, shot with 400 qt. of nitro from 7,125-7,343 ft., ran tubing and prepared to test. Last report on swabbing tests made about 10 bbl. of oil an hour. According to field reports, there was one 200-bbl. test tank on location but additional storage was to be erected.

York & Harper, Inc., 1-A TXL, 25-39-T3S-T&P, 13 miles south of Midland, plugged back from 13,250 ft. to 11,942 ft., set plug at 9,950 ft., retainer at 9,717 ft. and perforated with 112 shots from 9,737-65 ft. It was acidized with 2,000 gal. and was preparing to swab.

Ted Weiner 1 Hugh Dixon, 9-37-T3S-T&P, drilled deeper from 6,150 ft., was plugged back from 7,520 ft. to 7,325 ft., then shot with 600 qt. from 7,100-7,325 ft. It reported some free oil and a fair kick of gas while cleaning out at 7,250 ft. Location is ½ mile northwest of Tex Harvey 1 Floyd.

Ted Weiner 1 L. B. Floyd, 15-37-T3S-T&P, east to offset to the 1 Floyd discovery, completed for a pumping potential of 249 bbl. of oil a day, plus 10 per cent water. Completion was from open hole, from top of Spraberry pay at 6,610-8,012 ft., total depth. Gravity of the oil was 40°.

Borden County.—Standard Oil Co. of Texas 1 T. L. Griffin "6," 35-25-H&TC, in the northeastern corner of the county, prepared to drill ahead from 7,803 ft. after logging salt water on a drill-stem test of the reef lime. The 1-hour test from 7,589-7,803 ft. recovered 4,050 ft. of fluid, being 60 ft. of mud, 180 ft. of muddy salt water slightly gas-cut, 3,780 ft. of salt water and 30 ft. of drilling mud.

Martin County.—Spartan Drilling Co. and

Low Cost, Versatile FLOWRATOR flow meter in the pipeline . . .

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Company .....

Street .....

City ..... *State* .....

FISCHER & PORTER CO.

Dept. OM-3E Hatboro, Pennsylvania

PROCESS CONTROL INSTRUMENTS

Lohman & Gardner, Dallas, were reported ready to start operations on a 13,000-ft. Ellenburger wildcat in the northwest part of the county, about 9 miles southeast of The Texas Co. 1-X State, which reported some shows of oil in the Pennsylvanian, in drilling to 13,416 ft. The proposed operation is to be the 1 Ida Walcott, 12,661 ft. from south and 5,864 ft. from west lines, League 251, Ward CSL. Contract for the test was let to Carl B. King Drilling Co. Location is on farmout acreage from Magnolia Petroleum Co. In return for drilling the well, the operators, it was reported, were to receive checkerboard leases making up about half of the 10,000-acre spread.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Terry County, new field: Tide Water Associated Oil Co. 1 J. P. Nystel, NW NW 9-C38-PSL, 4 mi. NE Adair field, TD 12,094 ft., elevation 3,171 ft., top Fusselman 11,475 ft., pay 11,475 ft., PB 11,650 ft., perforated 268 shots 11,475-542 ft. and acidized with 5,000 gal., IP flowed 1,121.46 bbl. 35°-gravity oil a day, ¾-in. choke, GOR 18 cu. ft., TP 75 psi.

Tom Green County: Sun Oil Co. 2 M. P. Pulliam, SE SE 14-4-H&TC, 4 mi. W San Angelo, TD 5,552 ft., elevation 2,030 ft., top Strawn lime and pay 5,515 ft., IP pumped 28.4 bbl. 37-9°-gravity oil a day, from open hole 5,520-52 ft., GOR 209 cu. ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Borden County: L. H. Armer & Marvin Leonard 1 L. D. Rogers, 25-32-T3N-T&P, 2½ mi. E Vealmor field, dry, TD 8,582 ft., elevation 2,513 ft., reef 7,850 ft.

Seaboard Oil Co. 1-A J. B. Clayton, NW NW 14-32-T4N-T&P, 6 mi. NE Good field, dry, TD 8,414 ft., elevation 2,480 ft., anhydrite 1,060 ft., Yates 1,600 ft., San Andres 2,905 ft., Devonian 7,200 ft., Pennsylvanian 8,185 ft.

Coke County: Barnsdall Oil Co. 1 Findlater-Webb, Sec. 3, HE&WT Sur., 1½ mi. N Tennyson, 7½ mi. S Bronte field, dry, TD 5,725 ft., elevation 1,856 ft., Palo Pinto 4,430 ft., Caddo 5,230 ft., Ellenburger 5,545 ft.

Crocket County: Michaux & Kidd 1 C. E. Davidson, NE NE 50-GH-GC&SF, 7 mi. E Ozona, dry, TD 9,423 ft., elevation 2,479 ft., Strawn 8,694 ft., Simpson 8,792 ft., Ellenburger 8,920 ft.

Garza County: P. W. & R. S. Anderson 1 R. Clyde Miller, Sec. 29-6-H&GN, 5 mi. SW Callihan 1 Dorward, 3 mi. S Justiceburg, dry, TD 2,732 ft., elevation 2,437 ft.

Howard County: Southern Minerals and Forest Oil Corp. 1 R. V. Guthrie, SE SW 26-31-T1N-T&P, 2 mi. NW Coahoma, dry, TD 9,378 ft., elevation 2,467 ft., Pennsylvanian 6,965 ft., Ellenburger 9,340 ft.

Kent County: George S. Anderson and W. R. Childers 1 A. C. Cargile, 23-5-H&GN, 1 mi. SE Polar, dry, TD 2,389 ft., elevation 2,327 ft., San Andres 2,345 ft.

Pecos County: J. C. Shafter, Inc., 1 J. W. McMillen, 34-10-H&GN, 5½ mi. SW Imperial, dry, TD 2,000 ft., elevation estimated 2,435 ft., Yates 1,265 ft.

Scurry County: Honolulu Oil Corp. 1 Walter Brown, 65-3-H&GN, 1 mi. E Dunn, 12 mi. SE Kelley field, dry, TD 8,040 ft., PB 4,360 ft., elevation 2,295 ft., no results from Clear Fork, top Ellenburger 7,713 ft.

R. C. Lipscomb 1 N. C. Von Roeder, 75-25-H&TC, 2 mi. S Sharon Ridge Canyon field, dry, TD 8,050 ft., elevation 2,308 ft., reef 6,928 ft., Strawn 7,360 ft. Mississippian 8,000 ft.

Sterling County: Olson Drilling Co. 1 Bill & Lee Reed, SE SE 15-30-W&NW Sur., NW part of county, dry, TD 5,507 ft., elevation 2,517 ft.

SOUTHEASTERN NEW MEXICO

HOBBS—Humble Oil & Refining Co. 1 Wiggs, SW NE 31-24s-27e, Eddy County, New Mexico's deepest well, was drilling lime and sand at 14,787 ft. Cores from 14,711-764 ft. recovered hard sand lime, and shale with no shows.

DeKalb Agricultural Association, Inc., 2 Compton-State, 15-11s-27e, was shut down for orders at 1,993 ft., making ½ bailer of salt water an hour.

Amerada Petroleum Corp. 2-BTD, 35-11s-33e, northeast extension to Bagley field of Lea County, was drilling below 9,473 ft. A 4½-hour drill-stem test from 9,033-75 ft. had gas in 4 minutes, mud in 21, and oil in 23 minutes; then flowed 117 bbl. of 46°-gravity oil in 4 hours. Gas-oil ratio was 1,473 ft. Flowing pressure was 575 psi. Shut-in pressure in 30 minutes registered 3,100 psi. Top of the Pennsylvanian was 8,615 ft., on elevation of 4,249 ft. Projected depth was 11,500 ft., to test the Devonian.

Northeast of Lovington, Gulf Oil Corp. 1 Chamberlain, 14-15s-37e, was drilling below 11,085 ft. in lime and shale. Top on the Mississippian was 10,770 ft., minus 6,973 ft., and reported as being 260 ft. to the Denton field discovery.

James D. Erwin 1 State-Phillips, 26-17s-33e, 2 miles west of production in Vacuum field, treated with 1,500 gal. and 3,000 gal. of acid from 4,630-92 ft., then swabbed 1 bbl. of oil an hour for 48 hours. It was being retreated at last report.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

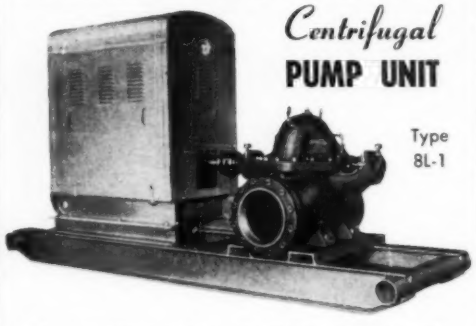
Chaves County: Honolulu Oil Corp. 2 Texas Co.-State, SW NE 13-11s-27e, dry, TD 2,115 ft., elevation 3,768 ft., San Andres 1,385 ft., PB 2,048 ft., swabbed 2 gal. oil, 39 gal. salt water in 8 hours natural, acidized, no results.

LOCKETT-WORTHINGTON

Centrifugal

PUMP UNIT

Type 8L-1



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THE OIL AND GAS JOURNAL

TULSA 1, OKLAHOMA

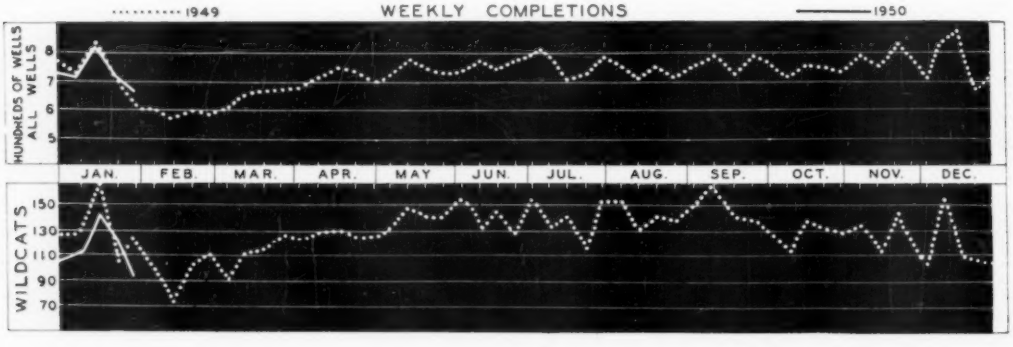
CURRENT STATISTICS

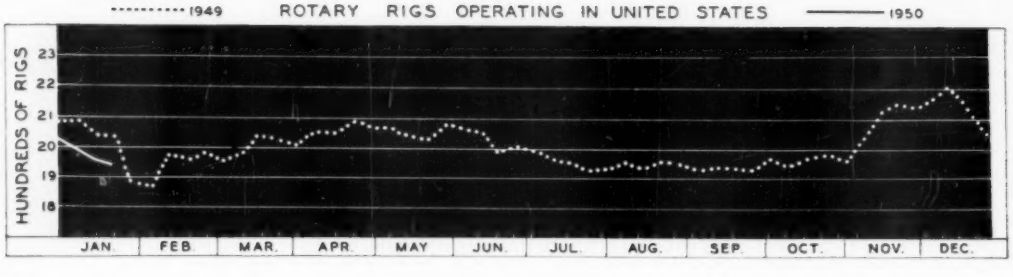
EXPLORATION

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JANUARY 28, 1950

	Total of all wells					Jan. 28		Wildcat completions and discoveries					Cumulative total, 1950				
	Comp.	Oil	Gas	Dry	Footage	1950	1949	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	16	8	0	*8	21,800	58	79	0	0	0	0	0	0	0	0	0	0
Pennsylvania	21	8	4	9	36,726	91	144	0	0	0	0	0	0	0	0	0	0
West Virginia	14	3	9	2	35,744	45	43	0	0	1	0	1	0	0	2	1	3
Ohio	17	8	3	6	26,485	65	92	0	0	0	0	0	1	0	0	1	2
Indiana	4	1	1	2	7,751	79	85	1	0	0	1	2	3	0	1	8	12
Kentucky	17	3	4	10	38,517	74	53	0	0	0	2	2	2	0	0	6	8
Illinois	44	23	0	21	90,650	191	169	0	0	0	12	12	2	0	0	41	43
Michigan	14	5	0	9	40,735	65	72	0	0	0	5	5	6	0	0	23	29
Kansas	45	23	0	22	155,250	222	224	0	0	0	0	0	4	0	0	25	29
Neb., Mo., Iowa	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	4	4
Oklahoma	89	46	7	36	301,936	339	299	3	0	0	15	18	12	0	2	43	57
Texas	271	182	11	78	1,245,893	1,120	1,024	3	2	0	31	36	28	4	10	138	180
North Central (Dist. 7-B & 9)	81	49	1	31	252,255	319	323	0	1	0	7	8	6	1	0	38	45
West (Dist. 7-C & 8)	72	55	1	16	398,945	282	235	2	0	0	11	13	10	0	0	35	45
Panhandle (Dist. 10)	16	11	5	0	48,976	112	85	0	0	0	0	0	0	0	0	0	0
Eastern (Dist. 5, 6, & 6-P)	21	17	0	4	92,028	91	49	0	1	0	2	3	1	1	1	15	18
Gulf Coast (Dist. 2 & 3)	37	29	1	7	247,918	161	164	1	0	0	5	6	5	1	3	23	32
Southwest (Dist. 1 & 4)	44	21	3	20	205,771	160	163	0	0	0	6	6	6	1	6	27	40
Louisiana	42	27	4	11	312,065	217	183	2	0	0	3	5	7	3	1	14	25
Northern	10	6	2	2	47,156	114	110	0	0	0	1	1	2	0	0	8	10
Southern	32	21	2	9	264,909	103	73	2	0	0	2	4	5	3	1	6	15
Arkansas	3	2	0	1	8,344	31	11	0	0	0	0	0	0	0	0	9	9
Mississippi	8	2	0	6	67,805	25	27	0	0	0	3	3	0	0	0	7	7
Southeastern States	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	1	1
Montana	0	0	0	0	0	16	16	0	0	0	0	0	0	0	0	4	4
Wyoming	12	9	0	3	62,144	57	33	0	0	0	1	1	3	0	0	10	13
Colorado-Utah	1	0	0	1	3,711	15	18	0	0	0	1	1	0	0	0	11	11
New Mexico	9	6	1	2	31,305	51	37	0	0	0	1	1	1	0	0	4	5
California	35	21	0	14	138,340	137	207	0	0	0	5	5	3	0	1	19	23
Dakotas	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1
Total United States	662	377	44	241	2,626,201	2,903	2,820	12	2	1	80	92	72	7	17	370	466
Total previous week	716	431	54	231	2,736,260			22	3	6	90	121	63	5	16	290	374
Total January 29, 1949	603	333	43	233	2,081,507			13	1	5	102	121	72	4	11	436	523

Service wells included: *8, 18, 12.





DAILY AVERAGE PRODUCTION FOR WEEK

	Jan. 28 crude oil	B. of M. Jan. demand	Jan. 21 crude oil
Alabama	1,650	1,200	1,650
Arkansas	79,750	82,000	79,400
California	866,900	836,000	867,400
Colorado	59,700	70,000	58,700
Eastern	57,500	59,500	56,000
Florida	975	1,000	1,025
Illinois	178,100	185,000	173,700
Indiana	26,300	29,000	26,200
Kansas	283,300	295,000	293,050
Kentucky	25,600	24,000	26,500
Louisiana	539,120	546,000	538,375
North Louisiana	121,100		120,350
South Louisiana	418,020		418,025
Michigan	44,400	45,000	44,200
Mississippi	99,350	104,000	96,300
Montana	24,800	25,000	23,500
Nebraska	1,400	700	1,500
New Mexico	131,220	136,000	131,225
Oklahoma	392,500	420,000	395,950
Texas	1,929,000	2,200,000	1,929,000
Dist. 1 (Southwest)	26,200		26,200
Dist. 2 (Southwest)	112,850		112,850
Dist. 4 (Southwest)	178,200		178,200
Dist. 3 (Gulf Coast)	357,575		357,575
Dist. 5 (Eastern)	32,550		32,550
Dist. 6 (Eastern)	81,425		81,425
East Texas field	222,000		222,000
Dist. 7-C (West)	46,950		46,950
Dist. 8 (West)	572,850		572,850
Dist. 7-B (W. Central)	62,300		62,300
Dist. 9 (N. Central)	143,500		143,500
Dist. 10 (Panhandle)	92,600		92,600
Utah	2,500	1,200	2,500
Wyoming	131,300	129,000	130,000
Total United States	*4,875,865	5,190,000	4,876,175
Change from previous week, down	310		
Canada	60,657		62,832

Total U. S. production January 1-January 28 †138,831,140 bbl.

Same period last year (crude plus cond.) 150,777,080 bbl.

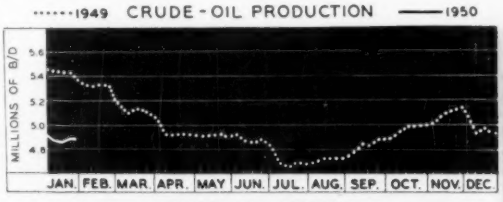
*Not incl. 91,219 bbl. condensate. †Incl. 2,512,510 bbl. condensate.

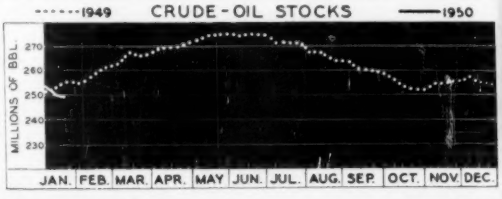
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

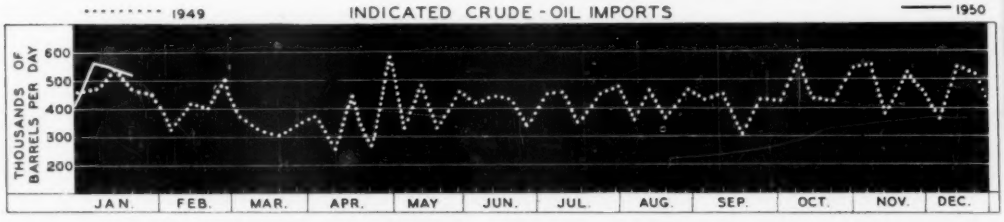
(Thousands of barrels)

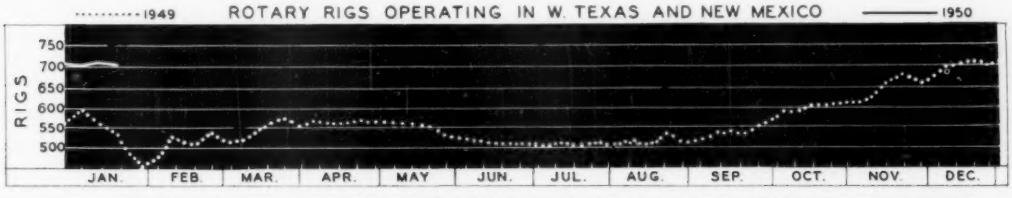
	Jan. 21, 1950	Jan. 14, 1950	Jan. 22, 1949
Pennsylvania Grade	2,731	2,756	2,877
Other Appalachian	1,760	1,751	1,438
Illinois, Indiana, Michigan	10,915	11,270	14,388
Arkansas	3,155	3,015	3,259
Louisiana	14,122	14,160	12,659
North	3,545	3,726	3,151
Gulf	10,577	10,434	9,508
Mississippi	2,488	2,429	2,722
New Mexico	7,343	7,647	6,532
Oklahoma and Kansas	36,874	37,378	35,876
Texas	111,567	111,133	121,116
East Texas	15,022	15,489	15,408
West Texas	40,419	40,816	48,169
Texas Gulf	29,603	28,750	29,346
Other Texas	26,523	26,068	28,193
Rocky Mountain	13,218	13,329	12,634
California	37,512	37,821	32,901
Foreign	7,439	7,178	7,951
United States	249,124	249,837	254,353

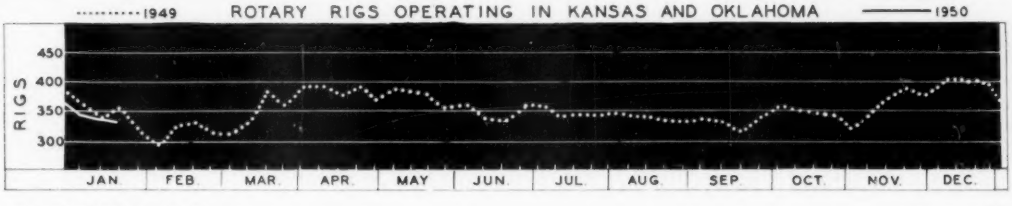
*Bureau of Mines.











A.P.I. REFINERY REPORT, JANUARY 21

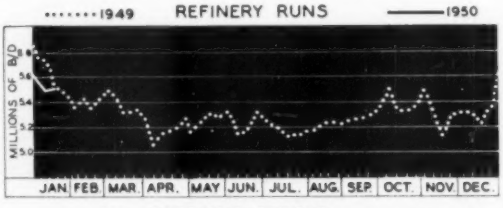
(Thousands of barrels)

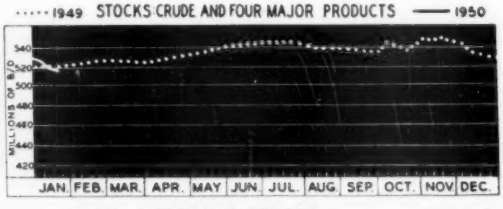
District	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate	Residual
East Coast	859	350.9	46.1	191.7	216.1	25,571	8,824	23,823	11,462
Appalachian:									
District 1	91	40.6	8.0	17.0	11.6	2,821	346	751	344
District 2	72	34.1	5.9	8.0	17.0	1,284	98	216	112
Ind., Ill., Ky.	972	486.9	71.7	158.3	174.6	25,086	3,419	9,046	3,677
Okla., Kans., Mo.	448	256.3	24.9	85.6	58.7	12,456	825	4,419	1,336
Inland Texas	197	142.1	12.3	23.7	39.4	4,193	486	780	738
Texas Gulf Coast	1,297	581.0	109.3	278.6	215.6	17,898	2,201	13,046	5,564
La. Gulf Coast	429	199.1	68.1	105.8	48.7	6,849	1,448	3,724	2,154
N. La. and Ark.	80	28.7	6.3	12.6	14.1	2,796	277	614	277
Rocky Mountain:									
New Mexico	12	6.6		1.9	2.9	97	25	78	33
Other Rocky Mtn.	172	82.4	6.7	30.3	38.6	4,056	212	1,442	672
California	884	361.0	21.1	155.4	343.6	19,218	936	11,436	32,216
January 21, 1950	5,513	2,569.7	380.4	1,068.9	1,180.9	122,325	19,097	69,375	58,585
January 14, 1950	5,487	2,631.7	382.7	1,085.1	1,151.3	118,844	19,217	71,075	60,003
January 22, 1949	5,642	2,565.9	336.3	1,139.9	1,358.1	111,587	21,999	64,364	63,725

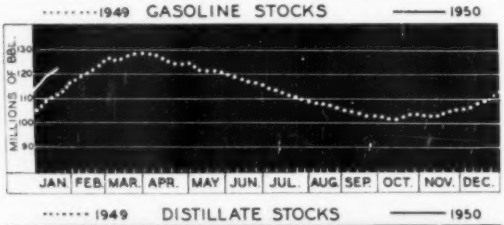
Bureau of Mines, January 1949

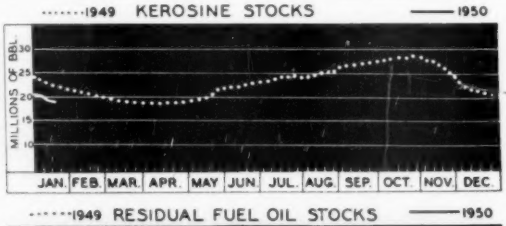
	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
	5,641	2,538.3	339.9	1,062.8	1,347.7

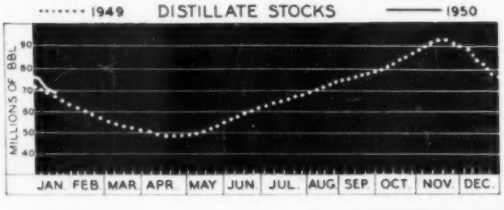
*At refineries including natural blended. †Finished and unfinished.

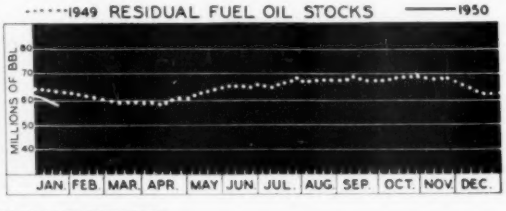


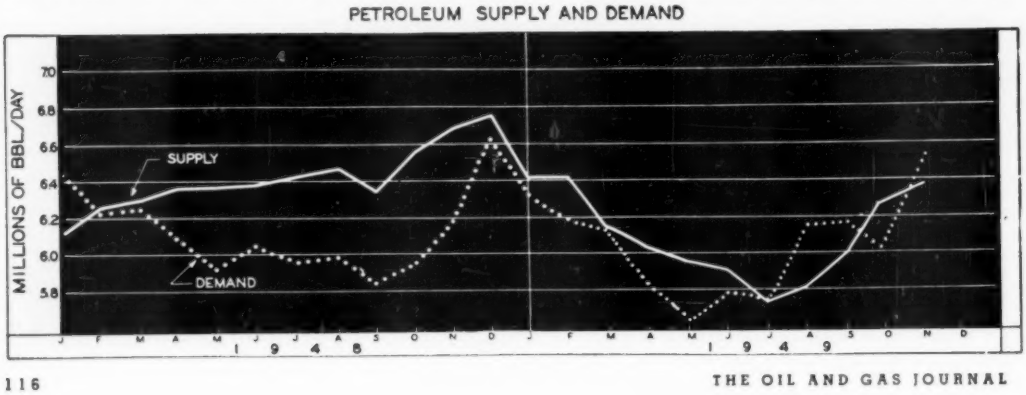












CRUDE PRICES
GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Okla-homa, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.53			
19-19.9	1.63			
20-20.9	1.73	$2.25		$2.12
21-21.9	1.82	2.27		2.14
22-22.9	1.92	2.29		2.16
23-23.9	2.02	2.31		2.18
24-24.9	2.12	2.33	$2.56	2.20
25-25.9	2.22	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947. Above changes do not include recent reductions of a few buyers applying principally to low-gravity grades.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	3.54
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above

OVERSUPPLY of heating oils in the northeastern part of the United States has brought further price reductions for all light heating oils. Suppliers point out that the lack of balance in supply and demand resulted from low demand rather than any large increase in supply. Esso Standard Oil Co., announcing price reductions, stated that the season to date has been 24 per cent warmer than normal and the warmest in 49 years.

For No. 2 fuel oil, some of the reductions have taken the form of larger discounts off the regular posted New York Harbor price which has been 8.5 cents a gallon. One major supplier increased its discount to .7 cent for a net of 7.8 cents a gallon. Some material moved at 7.6 cents.

Reductions for kerosine are reflected in the increased quantity moving at prices near the harbor "low" of 9.1 cents a gallon. The residual market remains firm with the harbor barge price holding at $2.05 per barrel.

Mid-Continent light-fuel markets are the antithesis of conditions on the East Coast. Demand is good. Prices are higher. Tank cars are scarce.

Group 3 prices moved up about ¼ cent a gallon for both kerosine and No. 2 distillate fuel. Kerosine prices range from 8½ to 8⅝ cents a gallon and where supplier can furnish the tank cars, quotations are probably based on the "high" of the market rather than the "low." No. 2 distillate price has increased about ½ cent a gallon in the past 4 weeks.

Low-sulfur residual fuel is still very scarce. Unconfirmed reports indicate some movement at better than $1.60 a barrel. Calls on the higher sulfur material raised the "low" of the market to $1.40.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of January 30, 1950. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Tex. Gulf Coast
Regular gasoline, 74-76 octane	9⅜-9⅞	10.5-11.1	9-9¾
Premium gasoline, 78-80 octane	10⅜-10⅞	11.5-12.1	9¾-10¾
42-44 w.w. kerosine	8½-8¾	9.1-9.5	8¼-8½
No. 2 straw fuel oil	7⅝-7⅞	7.6-7.9	7-7¼
No. 6 residual	$1.40-1.55	$2.05	$1.65-1.75

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5⅞	5⅜	5⅝
Grade 18-55	7.1	6.5	6.8

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	10.5
750 vis., No. 3-4 neutral	12.75
2,000 No. 5-6 neutral	14-14.5

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	17-19
200 vis., No. 3 neutral, 0-10 pp.	11.5-14

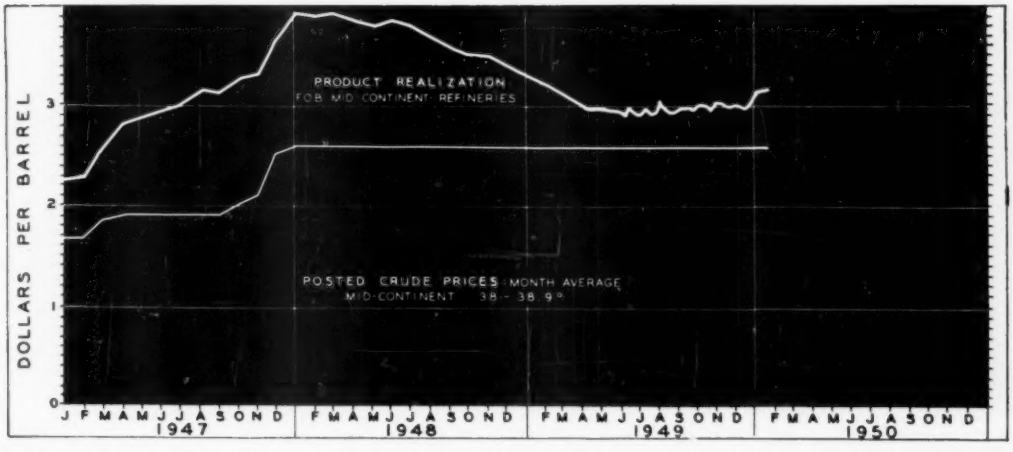
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	19.5-20.5
180 vis., 0 p.t. neutral	20.5-21.5

WAX

Mid-Continent

132-134 A.M.P.	4.25


DOLLARS PER BARREL
0
1
2
3
PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1947
J F M A M J J A S O N D
1948
J F M A M J J A S O N D
1949
J F M A M J J A S O N D
1950

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil

EQUIPMENT MEN . . . in the News

Mid-Continent Announces Two New Appointments

Appointment of Harold D. Powell to the position of manager, tubular department, Mid-Continent Supply Co., has been announced by Ken W. Davis, president and general manager. In addition, the appointment of L. G. Moore to the position of sales engineer of the Oklahoma City district of Mid-Continent, was announced by S. R. Clinkscales, Oklahoma City division manager.

H. D. POWELL

L. G. MOORE

Associated with the oil industry for 20 years, Powell came to Mid-Continent Supply in 1940 as city salesman in the Houston division. He was made store manager at Sullivan City, Tex., in 1941. Since 1945 he has been tubular manager of the Fort Worth division.

A graduate mechanical engineer from Oklahoma A. & M. College, Moore has been associated with the oil industry since 1935. Following 2 years in production and drilling work with Mexhoma Petroleum Co., he spent 13 years as engineering sales representative for American Chain & Cable Co. covering the Oklahoma, Kansas, and North Texas territories.

McLaughlin to Represent Bethlehem Steel Export

David C. McLaughlin, engineering representative for Bethlehem Supply Co. at Dallas, has taken up new duties as oil-field engineering representative for Bethlehem Steel Export Corp., with headquarters in New York City, according to an announcement by S. M. Bash, vice president.

A 1931 graduate of Penn State College, with a B.S. degree in petroleum engineering, McLaughlin was first employed by independent oil and gas-well operators in northern Pennsylvania. During 1933 and 1934 he was an engineer-geologist for the old Venezuela Gulf Oil Corp. in the Oficina and Santa Rosa districts of eastern Venezuela.

Returning to the United States in 1934 he joined Oil Well Supply Co., in time becoming sales engineer. He continued in this capacity until 1939, when he entered the employ of Bethlehem Supply Co. at Dallas. Bethlehem Steel Export Corp. on January 2 became exclusive export distributor for all products of Bethlehem Supply Co., of Tulsa, wholly owned subsidiary of Bethlehem Steel Co.

Irwin Joins Monsanto's Petroleum Chemical Sales

W. G. Krummrich, general manager of the organic chemicals division of Monsanto Chemical Co., has announced that James B. Irwin, Jr., has become a member of the petroleum-chemical sales department.

Irwin, assistant to the president since September 1948, has been with the company since 1940. He received a B.S. degree from Princeton in 1940 and an M.S. in chemical engineering from Washington University in 1948. In August 1942 Irwin was transferred from the Monsanto, Ill., plant to the Longhorn Ordnance Works operated by Monsanto for the Government at Marshall, Tex., where he served as an assistant area supervisor.

He became an area supervisor in June 1945 and returned to the Monsanto, Ill., plant in October of that year as a member of the plant's development department. In June 1946 he became supervisor of the chlorine department at Monsanto.

Graver Water Conditioner Names Two Representatives

Graver Water Conditioning Co., manufacturer of equipment for all treatment processes, has announced the appointment of Brookman-Kron Associates as its sales engineering representative in the Buffalo territory, and of Russell R. MacDonald Co. as its representative in the Richmond territory.

Brookman-Kron is headed by Roger R. Brookman and E. Phillip Kron, both of whom have had extensive experience in the engineering and sales of industrial process equipment.

The MacDonald organization, headed by Russell R. MacDonald, serves a number of industries in the Richmond territory, and has had wide experience in the engineering and sales of processing equipment. The company will handle the entire line of Graver water-conditioning equipment.

Stahl Made Division Sales Manager for Blackmer Pump

B. L. Gordon, president, Blackmer Pump Co., Grand Rapids, has announced the appointment of G. W. Stahl, Chicago, as division sales manager.

Stahl will direct distribution of Blackmer rotary pumps through jobbers in Illinois, adjacent counties in Indiana and Iowa, and in part of Kentucky. He formerly represented A. O. Smith Corp., and Yale & Towne Manufacturing Co.

Link Made Assistant to Oilwell's President

F. E. LINK

G. M. AMSTUTZ

Fred E. Link, general works manager for Oil Well Supply Co., U. S. Steel subsidiary, has been named to the post of assistant to president, Fred F. Murray, president, has announced In the newly created position Link's primary duty will be the study and development of programs for facilities improvement to provide economies in manufacturing and distribution. He will continue to headquarter at Oilwell's home office in Dallas.

Gordon M. Amstutz, chief industrial engineer for the past year, succeeds Link as general works manager. Amstutz is located at the company's Imperial Works at Oil City, Pa., where his headquarters will remain.

Joining Oilwell in January 1946 with a wide background in mechanical and industrial engineering, Link served first as assistant to vice president, handling special industrial-engineering assignments. In 1948 he became assistant to president, in charge of the manufacturing department. His title was changed to general works manager on January 1, 1949. Amstutz came to Oilwell as chief industrial engineer in January 1949. He received a B.S. degree in electrical engineering from Ohio State University in 1927.

Schopflin Made Assistant Sales Manager for Spencer

Spencer Chemical Co. has announced the promotion of William Schopflin to the position of assistant sales manager, industrial chemical sales. Schopflin, who has been with the company since 1946, was formerly sales supervisor, industrial chemical sales. He will continue to make his headquarters in Spencer's executive and sales office in Kansas City.

Streger Joins Oil Well Manufacturing Corp.

JIM STREGER

Jim Streger, for many years district manager for International Cementers, Inc., has joined Oil Well Manufacturing Corp., Los Angeles, in a sales capacity. After a 2-week training period at the plant, he will move to Ventura to serve the area from Newhall to Santa Maria, under the supervision of Best Dawson, sales manager for Red Devil slush-pump products. Streger was previously stationed in Ventura and Wyoming and is well known throughout the coastal and Rocky Mountain territories.

Munford is Vice President Of American Steel & Wire

Walter F. Munford, who started with American Steel & Wire Co. as a die reamer 30 years ago, has been elected vice president in charge of operations of the company, it has been announced by President Harvey B. Jordan.

In his new post, Munford takes the office vacated by Jordan who assumed the presidency of the wire company, a U. S. Steel subsidiary, the first of this year. In April 1942 Munford was named manager of operations of the Worcester district from which post he moved to assistant vice president in charge of operations under Jordan 3 years later.

Foxboro Appoints Temple For Baton Rouge Office

Foxboro Co., manufacturer of industrial instruments for measurement and control, has announced the appointment of Joseph M. Temple as manager of the branch office located at Baton Rouge. He succeeds John B. Deaderick, now manager of the Tulsa office.

Temple, who has already assumed his new duties, until recently was sales engineer with J. B. Beaird Co., metal fabricators for petroleum refining and other heavy industries. Prior to the war, he was associated with Petroleum Engineering, Inc., at Houston, as a field engineer and later as plant superintendent.

Conoflow Names Two Sales Representatives

Conoflow Corp. has announced the appointment of the following new Conoflow district sales representatives. J. V. Tripoli & Co., Inc., Buffalo, N. Y., has been appointed Conoflow district sales representative for the Western New York area.

E. Roy Myers Co., Cincinnati, has been appointed district representative for the southern portion of Ohio, including Columbus. Kentucky and five counties in southeastern Indiana are also included in Myers' territory.

Both of these companies are established manufacturers' representatives and will handle the Conoflow line on an exclusive coverage basis in these territories.

Patent Index Added to Davis Welding Library

The department of welding engineering at Ohio State University has announced completion of a new patent classification index in the A. F. Davis Welding Library, designed to make information on more than 12,000 patents on welding more easily available to industry and educational institutions.

Each patent in the library is classified or indexed in several different ways; by process, material, product, use, inventor's name, and date of issue, on a single keysort card. These cards are sorted mechanically, and in very little time the number of patents pertaining to a given field may be determined.

The index covers not only the fundamental patents on welding processes and equipment but also the very important field of industrial applications of the welding processes. Essentially, the type of information made available through the system is in the form of patent numbers relating to a designated area. Interested industrial organizations then may order those patent specifications from the patent office and refer to the material covered. The patent specifications are on file in the Davis Library and may be consulted by anyone making a search in person.

The use of the patent classification system is offered to industrial organizations, individuals, and educational institutions. Services are free of charge to those who make use of the index system in person, but modest charges to defray clerical expense will be made for inquiries handled by mail, Prof. Robert S. Green, acting chairman of the university's welding engineering department announced.

National Supply Makes VanVleet Division Manager

W. VANVLEET

William VanVleet has been appointed eastern division manager of National Supply Co., comprising 32 of the company's supply stores. National Supply has also announced the transfer of L. S. Ousterhout from the Oklahoma division to the general staff of the company.

VanVleet has been associated with National Supply since 1913. He was appointed store manager in Bolivar, N. Y., in 1929, became a district manager in 1934, and since 1942 has been assistant manager of the eastern division. In his new position he succeeds Ernest N. Smith who retired January 1.

Ousterhout, who will continue to headquarter in Tulsa, joined National Supply in 1931 as production-equipment sales representative. On his new assignment his efforts will largely be devoted to the application of National Supply equipment to deep-well pumping.

Big Four Buys Plant to Serve Golden Trend Area

John R. Riley and G. C. (Red) Ross, of Big Four Machine & Supply Co., have announced the purchase of Beaver Tool & Machine Co., Maysville, Okla., from Fred Wallace and associates. This shop, while retaining the name of Beaver Tool, will serve the Golden Trend area in western Oklahoma and North Texas by becoming a third manufacturing and distribution point for Big Four products.

The other two Big Four plants are located at Clay City, Ill., and Pawhuska, Okla. Big Four products include long-sweep, high-pressure fittings; slim-hole rotary tables; and swivels and traveling blocks. C. L. Crotts, of Pawhuska, has been transferred to Maysville as manager.

Petroleum Barges Lead List of Hull Launchings

Of 111 hulls for river and harbor vessels launched by Dravo Corp. at its Pittsburgh and Wilmington shipyards during 1949, 44 were petroleum barges.

The petroleum barges, more than were launched for any other industry, were designed for specific services such as bunkering and transporting lubricating-oil stocks. Four of the barges launched at year's end were for Cornelius Kroll & Co., Houston contract towing company. Each of these barges is 290 ft. long, 50 ft.

(Continued on page 123)

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DISPLAY CLASSIFIED
$12.00 a column inch one issue . . .
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UNDISPLAYED CLASSIFIED 12c a word one issue. 10% Discount three or more issues. $3.00 minimum charge. Blind Box in our care counts nine words. Payable in Advance.

EQUIPMENT FOR SALE

ROLAGRIP COUPLINGS—For Sale, 100 tons, 1½" to 8" inclusive. New, never used, complete with bolts and neoprene gaskets. Price 50% less than manufacturers selling price. Send for list. JULIUS M. FOGELMAN, Reading, Pa.

FOR SALE OR LEASE: Heavy duty oil well cementing truck. Equipment includes two 5 x 10 pumps. For details write Fred R. Holland, Box 3844, Odessa, Texas.

USED cable tools, sand reels, wire lines, and rotary drilling tools. E. A. Kelly, Box 861, Oklahoma City. Phone 5-6407.

FOR SALE at our Barnsdall-warehouse: 665' 13" OD 50# used Lapweld Casing. $2.25 per foot, take all. Cities Service Oil Co., Patridge, Bartlesville, Okla.

NEW Byron Jackson "Pup" Centrifugal Pumping Units with Chrysler Ind-9 engines — Army surplus — export boxed with parts and tools—condition perfect—supply limited—price attractive—available for immediate shipment from Houston.

HALLORAN EQUIPMENT CO.
431 Kress Bldg. Ph. CA-1447
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FOR SALE

New and Used 48-L, 36-L, 28-L, 24-L, 22-W and 21-W Bucyrus-Erie Drills.

BEACON SUPPLY CO.
Box 398 Pampa, Texas Phone 3377

FOR SALE

4—250 bbl. 4—500 bbl. low type
4—1,000 bbl. high type 4—1,500 bbl.
3— 5,000 bbl. 5—10,000 bbl.
All NEW closed A.P.I. bolted type steel tanks
4—NEW closed welded steel tanks 7'6" dia. x 13'6" long, 5/8" shell, 3/4" bulged heads
3—NEW vertical welded steel tanks with welded stands, 4'8" dia. x 18'8" high, 1½" thickness, bulged heads
16—Used horizontal welded steel tanks 8' dia. x 30' long, ¼" thickness, approx. 12,000 gal.
20—Used vertical welded steel tanks, like glass enameled inside, 10'4" dia. x 17'4" high, 3/8" shell, dished heads
100—Used closed vertical Cypress WOOD tanks, approx. 10' diameter, from 8' to 18' high, complete with round hoops and lugs

We carry large quantities in stock for immediate shipment of New and Guaranteed Used steel PIPE and TUBING up to 30" in diameter.

Your inquiries will be appreciated

A. GREENSPON PIPE CO., Inc.
3615 Olive St. St. Louis 8, Mo.
LUcas 5651

FOR SALE: Two steel mud tanks, 5 feet by 8 feet; 30 feet long, made of ¼" steel, sloping bottom. Never been used. $3200. Located Makin Drilling Company's yard, Hobbs, New Mexico.

FOR SALE: 1—36-L Bucyrus Rig, 1948 model, complete with all tools. Phone 2032, Henderson, Kentucky.

FOR SALE: Complete, Two pipe pulling units, trucks, fishing tools, and all equipment. Tom Dietle hoists complete, ready to go to work. Located Great Bend. Contact: G. L. Berry, Box 981, Hutchinson, Kansas.

FOR SALE—COMPLETE POWER RIG. Three years old—Running at Winters, Texas—Twin Engine Cardwell Draw Works, 7500 foot capacity—WAK Waukesha Engines —7¼ by 14 inch Oilwell Pump—5000 feet 4½ inch Drill Pipe—Brand new mud mixer. Spinning cathead—$35,000. Contact Ernest Baccus, 700 Thompson Street, Kilgore, Texas. Phone 2297.

FOR SALE—HYDRAULIC CASING PULLING MACHINE
Mounted on 1947, 1½ Ton Dodge Truck —complete unit to pull 5½"-7" O.D.— 8⅝" and 10¾" Casing. Gin poles—steel dog house, Rex centrifugal pump and all necessary tools.
J. F. SMITH
Phone L.D. 33
302 Masonic Building Shawnee, Okla.

Several Army Surplus 4½" x 6" Gaso Duplex 1860 Pumps—two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

H. H. COFFIELD
ATTN: W. H. Orr
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FOR SALE
8000' CAPACITY ROTARY RIG

Unit Rig U-15 Draw works; powered by two Waukesha NKU 225 H.P. Motors; National C-250 Pump; Bethlehem 150-T Swivel; 4200 B-J Triplex Hook; Type A-250 Gumbo Buster Traveling Block; 17½" Gumbo Buster Rotary Table; Thompson LR Shale Shaker; 5000' new 4½" Drill Pipe; 3000' ±2 4½" Drill Pipe. Complete Rig in excellent condition.

J. F. SMITH
302 Masonic Bldg., Shawnee, Oklahoma
Phone L.D. 33

LINE PIPE
(Like New Condition)

7,000 ft. 6⅝" O.D., 18.97±
7,000 ft. 3½" O.D., 7.57±

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MID-STATES PIPE & SUPPLY CO.
Ph. 2-9128 Tulsa, Okla.

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

OIL STORAGE TANKS

FOR SALE greatly below cost. One 1,000-bbl. and two 500-bbl. tanks—bolted, steel construction. Company in receivership. Box D-357, The Oil and Gas Journal, Tulsa, Oklahoma.

WAR SURPLUS MACHINERY
Gaso, Byron Jackson, Aurora, Wayne, Lombard, & Hale Fire Pumps with Engines, 1½ to 25 KW Generator Sets or Light Plants, Engines, Suction Hose, Fire Hose, Victaulic Couplings & Etc. Write for listing. H. A. McCarthy, 310 Thompson Bldg., Phone 5-3296, Tulsa, Oklahoma.

FOR SALE
PACKAGED COMPRESSOR

3¾ and 3¾ x 12 Ingersoll-Rand, Beaird type 4XVG-1 heavy duty, direct-connected four cycle, gas engine driven, single stage compressor, skid mounted. Excellent condition—operated only 2400 hours.

Wire or write:

Purchasing Department

IOWA-ILLINOIS GAS & ELECTRIC COMPANY
Davenport, Iowa

PIPE THREADER

1—±8 HD Jarecki, High Speed, Pipe Threader, capacity 1½" to 8", complete with chasers and six sets new dies. Timken fitted, 6 spindle speeds, automatic, self-opening die head—cut off and reamer attached, complete with 5 HP motor mounted in base.

Price $1,250.00

Stewart Bolling & Co., Inc.
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Railroad Tank Car Tanks. 6,500 to 12,000-Gal. Cap. Coiled and Non-Coiled.

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Heavier—Safer—Cheaper
Other Tanks, Too.

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EQUIPMENT FOR SALE

MUD Hog Pump 7¼ x 12 Gardner-Denver, and other drilling equipment. See at Garrett Equipment Co., Wichita Falls. Make an offer to D. F. MacKinnon, 3200 Main Street, Dallas, Texas, Phone C-6415.

FOR SALE: Approximately 15,000 feet of 6" OD "Invasion" Steel Pipe, Wt. about 9#, 6⅝" OD Plain Ends, 20' lengths. New condition. Also, approximately 15,000 feet of 6⅝" OD Plain End Stand Black Steel Pipe, No. 2 Grade. M. KAPLAN & SON, Box 1683, Phone 942, Monroe, Louisiana.

Dismantling Complete Refinery

FOR SALE

Any and all parts of the Carter Oil Refinery at Billings, Montana.

Wire, Write or Call

PEPCARR COMPANY
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SMALLEST, prettiest Miniature Tri-Cone Rock Bit made. Less than one-half inch diameter. Cones turn, will not come out. Gold or nickel plate. On tie chain clasps, strap type for watch fobs and ring type for charms.

Nickel plate $4.00
Gold plate $4.50
Check, Money Order or C.O.D.

H. McGAUGHEY
P.O. Box 11063, Houston, Texas

LIQUIDATING!
$250,000 INVENTORY
New Refinery Supplies

Pump and compressor parts
Instrument and relief valve parts
Condenser tubing — steel and admiralty
Pipe covering coating
Electrical supplies
Stainless steel pipe
Paint
Valves and fittings
Sheet packing—pump packing
Chemicals—catalyst
Welding rod and welders equipment
Safety and fire fighting equipment
Stud bolts, alloy—machine bolts

DULIEN STEEL PRODUCTS, INC.
of Washington
P. O. BOX 667
COTTON VALLEY, LA.
PHONE: COTTON VALLEY 26

EQUIPMENT FOR SALE

EQUIPMENT: New and used spudders, rotaries, core drills; cable tools, drill pipe, PK rods. Everything for well service. We rent fishing tools. Pressey & Son, Pueblo, Colorado.

FOR SALE, south of Wewoka in the Fish Pool: 21,000' of 4" OD boiler flue oil line, 15 cents per foot as is, 25 cents per foot taken up. Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

FOR SALE: 3 New 10,000 bbl. A.P.I. Columbian Bolted Steel Tanks. 160—8000 & 10,000 Gal. Tank Cars. Darien Corp., 60 E. 42nd St., N. Y., N. Y.

FOR SALE at Hobbs, N. M.: 1—Used Allis Chalmers Model UM-4 Skid Well Servicing Unit, $1350.00. Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

FOR SALE: One Star A-83 Speedster in excellent condition. For information, call Carl A. Lesh, Hart, Michigan, or D. B. Lesh Drilling Company, St. Elmo, Illinois.

FOR SALE at Oklahoma City—1 Hobart Skid Type 300 Amp. Model GR Welding Machine driven by 63 HP Chrysler Engine, completely overhauled. $650.00. Cities Service Oil Co., Patridge, Bartlesville, Okla.

EQUIPMENT FOR SALE: 1 Clark engine and compressor, engine 80 hp., size 16" x 15" x 7¼" x 20", 200 r.p.m. compressor, intake pressure 0 pounds discharge pressure 350 pounds, type Q compressor cylinders.

1 Bruce-McBeth gas engine, 200 hp., 4 cylinder size 13" x 16", serial 485.

Equipment second hand, in good condition.

American Liberty Oil Company, Box 1011, Mt. Pleasant, Texas.

USED WATER TUBE BOILER

210 H.P. 200# W.P. Erie City 3 drum boiler Tubes and Drums in perfect condition. Price $6280. F.O.B. Cotton Valley, La.

MOORE & COMPANY
601 Oil Capital Bldg., Ph. 2-0058
Tulsa, Okla.

EQUIPMENT WANTED

WANTED: Two Sweetland Presses; Size #3 to 7 inclusive. Also, Oil Canner. Oklahoma Refining Company, Box 1265, Seminole, Oklahoma.

WANTED: COMPLETE #6 Baker, cable tool, coring barrel. Write condition, location and price: Williams Oil Co., 915 South Main, Ottawa, Kansas.

SITUATIONS WANTED

PETROLEUM ENGINEER: Graduate, single, 24, desires position in production field. Year's experience as junior engineer in production work, Venezuela. Good references. Box D-345, The Oil and Gas Journal, Tulsa, Oklahoma.

INSTRUMENT SUPERVISOR: Ten years experience maintenance of refinery and powerhouse installations. Familiar with fluid catalytic cracking and modern construction practices. Now employed. Prefer Rocky Mountain area. Box D-351, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 131, Ph. No. 131, Hobbs, New Mexico.

DESIRE CHANGE. Plant superintendent or assistant, age 40, 16 years' refining experience, 5 years supervision fluid catalytic cracker. Now employed. Highest personal and experience references. Available reasonable notice. Box D-367, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN OR DOMESTIC EMPLOYMENT desired as operator or process supervisor. Have 17 years' experience refineries, chemical units, and gasoline plants. (11 years spent foreign service for S.O.W.J.) Job security and working conditions most important consideration. High-school education, speak Spanish, married, age 38, excellent references. Box D-368, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

GEOLOGIST with drafting ability, major oil company experience, currently active independently with Oklahoma subsurface geology, desires position with independent oil company. P.O. Box 1884, Tulsa, Oklahoma.

CHEMICAL ENGINEER: Three years' experience process engineering and operations technology, catalytic cracking, absorbtion, crude running. Seeking position as process engineer and/or operations technologist, refinery engineer. Age 28, family. Box D-366, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE petroleum and geological engineer, 25, desires position home or abroad. Excellent references. Box D-369, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: B.S. degree. Experience in West Texas, New Mexico, North Central Texas, Mid-Continent area, and Illinois, desires position with aggressive company. P. O. Box 183, Tulsa, Oklahoma.

SENIOR GEOLOGIST-PETROLEUM ENGINEER. Now employed desires change. Thoroughly familiar with drilling supervision, production methods, and sub-surface. Mid-Continent, Illinois Basin, and Texas experience. Consider consultant basis, salary, retainers fee, drilling interest, or combination. For interview phone 2-8603 or write: Geologist, 1720 South Norfolk, Tulsa.

DESIRES CHANGE: Refining and Production Material Man, Experienced in Auditing, Inventory, Control, Purchasing and Sales. Can furnish the best of references. Age 35, Box D-302, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT — MBA Degree Indiana University, Master's Thesis, "Accounting for Drilling and Exploratory Operations." 30, married, locate anywhere, Rodney Moore, 302 South Madison, Bloomington, Indiana.

HELP WANTED

JUNIOR ENGINEER wanted by independent oil company operating in West and West Central Texas. Must be recent graduate with petroleum engineering degree. All replies should contain outline of training, past experience, if any, age, marital status, date of availability, and starting salary desired. Recent photo or snapshot would be helpful. Address Box D-312, The Oil and Gas Journal, Tulsa, Oklahoma.

SALESMAN experienced in Houston Territory as Oil Field or Industrial Salesman. Inside or outside experience. Room for advancement in established supply company. Please send complete data, experience, age. Box D-356, The Oil and Gas Journal, Tulsa, Oklahoma.

NEW foreign and domestic Oil Employment Directory. Over 500 listings in drilling, production, refining, natural gasoline, pipe lines, geological, exploration, supplies, manufacturers, services; and trucking, refinery and pipe line contractors, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla. (Our 28th year).

ENGINEERS, Executives, Technical Men. Salaried positions — $3600 to $30,000. This confidential service for outstanding men who desire a change of connection, will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

Engineer Wanted

Graduate engineer experienced in the design of drilling rigs is offered a permanent position with old, reliable and progressive company located in the Southwest. Give background and experience.

Address Box D-363

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

HELP WANTED

HIGH type, responsible executive wanted as Manager Latin-American operations for substantial independent producing company entering foreign operations. Applicant should be college graduate, under 40 years of age; have minimum 15 years' experience in production and drilling work, particularly in high pressure oil and gas well completions. Applicant should speak Spanish fluently, have thorough experience in development Geology, be equipped to prepare and maintain adequate reservoir and engineering studies including repressuring and pressure maintenance. Excellent compensation. When replying, give full details. Our present employes not considered for this position. Box D-364, The Oil and Gas Journal, Tulsa, Oklahoma.

WTD: PROCESS ENGINEER. Major engineering contractor expanding service needs process engineer with minimum five years experience in process design of refinery and gasoline plant units. Man with experience in operation will be favored. Reply should contain summary past experience and training, date of availability, and starting salary. Box D-365, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Mechanical design engineer and draftsman with minimum three years' experience oil refinery piping engineering. Engineering degree preferred. Permanent positions for qualified men. Give complete review experience record with application. Address E. M. Skinner, Chief Engineer, Socony-Vacuum Oil Co., Inc., Augusta, Kansas.

ALL around practical refinery engineer for number two man U. S. company in British Colony, U. S. dollars salary, to assist Manager in supervision terminal and small refinery, general camp duties, excellent future, replies held confidential. Box D-353, The Oil and Gas Journal, Tulsa, Oklahoma.

SALESMAN WANTED who calls on refineries, tool and instrument manufacturers, to offer a specialty sideline with good profit possibilities. Tulsa Cabinet and Fixture Co., 2545 East Admiral Place, Tulsa, Oklahoma.

WANTED

Specialty men to sell orifice plates, nipples, instrument accessories manufactured by us for the oil and chemical industry.

Write for information.

INDUSTRIAL INSTRUMENT CORP.

P. O. Box 1909 Odessa, Texas

HELP WANTED

WANTED: Engineer with experience in core analysis to supervise routine laboratory and research work and interpret routine results. Advanced degree preferred. Salary open. State experience, education, and salary expected. Continental Oil Company, Personnel Division, Ponca City, Oklahoma.

EXPERIENCED gravity personnel for foreign work, party chiefs, surveyors, and operators. All expenses. The best opportunity in the industry to make money and advance. Exploration Surveys, Inc., 5615 Daniels Avenue, Dallas 6, Texas.

ROYALTIES

SPOT CASH for PRODUCING ROYALTIES
GERBER & COMPANY (Est. 1934)
120 WALL STREET, NEW YORK, N. Y.

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

SCURRY COUNTY ROYALTIES
Send for list of choice Scurry County Royalties. Also have royalties under major blocks cheap. Navarro Royalties Company, Odessa, Texas.

MONTANA ROYALTIES
Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225, Great Falls, Montana.

SCURRY COUNTY, producing royalty for sale, thick reef section good reserves. Also several pieces Non producing royalty in trend. Write for particulars. Louis Egan, 6867 Gaston Avenue, Dallas, Texas.

PRODUCING GAS ROYALTIES
Have for sale 141 acres Carthage Gas Field producing royalties. $150 per acre. Navarro Royalties Company, Telephone 6439 or 9471, Odessa, Texas.

TEXAS' GREATEST OIL PLAY
KENT COUNTY ROYALTY

all under the
Barnsdall—Seaboard
H. L. Wentz, Estate
27,000 acre lease
¼ of 14,000 acres Royalty
Spread—$225 per acre base

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Wire, Call or See:

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Phone 2-9555

HELP WANTED

Executive Director of Technical Operations NEEDED

A multi-division corporation operating in the hydrocarbon and silica fields seeks an outstanding man to direct its production, engineering and research activities.

He will have full responsibility for plant design, engineering and construction, and the evaluation and control of both long and short-term research projects through laboratory, pilot plant, process and general engineering stages. In staff capacity he will also serve as senior executive on matters relating to manufacturing, including process development and industrial engineering.

Our operations are varied and complex. Our record of growth and progress is outstanding. We are interested in further diversification along related lines with the result that our future growth potential is excellent.

Salary is commensurate with the responsibility of this top level executive position. Applications will be treated in strict confidence and will receive immediate consideration.

Box D-362, The Oil and Gas Journal, Tulsa, Oklahoma

LEASE AND DRILLING BLOCKS

SEE A. L. BOWLES, ADA, OKLA., FOR DRILLING DEALS, LEASES, ROYALTIES

WYOMING-POWDER River Basin, Southwest edge, Continental Oil to drill Lakota test. Will sell royalty and lease. Box D-354, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Oil and Gas Leases and drilling propositions in shallow territory of Allen, Simpson, and Warren Counties, Kentucky. W. P. Harley, Bowling Green, Kentucky.

SELL oil and gas lease near deep and shallow production. 200 acres section 9, 1 north, 5 west, Stephens County. Hattie Harrell, Phone 931 East Highway, Duncan, Oklahoma.

4,000-ACRE drilling block along Eastern Brown County and Western Comanche County lines. Write or wire: W. H. Mahon, P.O. Box 821, Brownwood, Texas.

FOR SALE: 131 acre, 10 year oil and gas lease, surrounded by major company holdings, Shelby County, Texas. Price $5 per acre. Write for information. C. A. Parker, Box 451, Center, Texas.

NORTHWESTERN COLORADO, Rio Blanco, Moffat and Routt Counties, produces 98% of all oil produced in state of Colorado. Now served by three pipe lines—have three structures mapped by major oil company geologists and U.S.G.S. within one to eight miles of pipe lines—11,000 acres of leases—will sell ½ interest, $10.00 per acre, $110,000.00 and drill three wells free. Want someone willing and able to spend some tax money for drilling—no widows or orphans—Full commission to brokers furnishing buyer. S. Marvin James, Meeker, Colorado. Phone Meeker 4.

OIL LEASE farmouts, N. W. Georgia, Shallow Pennsylvania formations, sandstone, shale, limestone. C. W. Deming, Jefferson Hotel or P. O. Box 1874, Tulsa, Oklahoma.

NORTH DAKOTA—LEASES & ROYALTIES
Inquiries invited: Curran and Curtis, Box 165, Bismarck, North Dakota.

SCURRY County Leases and Royalties for Sale. H&TC RR Survey, Block 97. Inquiries confidential. References exchanged. Box D-371, The Oil and Gas Journal, Tulsa, Oklahoma.

17,000 ACRES, Great San Juan Basin, New Mexico: 10-year lease, 25c rentals. Ideally located. $1.75 acre. Small Oil Payment. Inquiry invited: Box D-349, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited
B. D. BUCKLEY
6378 Clayton Road, St. Louis 17, Mo

NEW MEXICO OILFIELDS

Offer limited amount Royalty within mile of important well drilling sec. 31, 2S, 31E, Roosevelt County, N.M. on same contour at $45.00 p.r.a. Also 160a lease $25 p.a. Oil & Gas and water in 300' down dip wells confirm structural trap of major size. Contour sub-surface maps & details to responsible sources.

Box D-359, The Oil and Gas Journal, Tulsa, Oklahoma

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing, Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

NOTICES

PLEASE WRITE me if you know what Company Harbor Oil Co. merged with, 1927 or after. Operated in Arkansas; also Prime Oil Co., Wichita, Texas, 1923. Appreciate this very much. John Schoenborn, 5941 No. Washtenaw Ave., Chicago 45, Ill.

FOR SALE

FOR SALE: Structural Steel Bldg. 30'x56' x10' Walls. Heavy construction. Price $1100.00 F.O.B. Okla. City. Phone 5-6407.

FOR SALE OR TRADE: One Twin-Motor Beechcraft, fully equipped for all types of flying. Would be especially interested in securing an oil payment. Box D-372, The Oil and Gas Journal, Tulsa, Oklahoma.

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

SERVICES

LET us help you locate your oil wells. Our scientifically instrumentation survey will show you where there is oil, outline complete pools, number of pays, etc. Most positive results; let us prove it to you. Don't waste your money on dry holes. Our services are reasonable. Breuer Bros., Sheridan, Ill.

FOR SALE—MAPS

CURRENT East Texas Field salt water encroachment maps. In colors. Scale 1" = 2000'. $65.00 each. C. L. Anstine, Route 1, Kilgore, Texas.

WANTED

ROYALTIES—LEASES WANTED

Producing Royalties wanted in Texas. Also proven or semi-proven leases in West Texas. Would like some in Scurry, Mitchell, Borden, and Kent counties.

Box D-370

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

Equipment Men

(Continued from page 119)

wide, and 12 ft. deep. In operation, two will be joined end to end, forming a single vessel 580 ft. long, capable of carrying 49,000 bbl. of gasoline or other petroleum product.

Lane-Wells Promotes Three

Lane-Wells Co. has promoted three executives, according to D. S. Jeppson vice president and controller. L. H. Ingle has been named assistant controller, a new position; Robert L. Walsh has been made chief accountant succeeding to Ingle's former position; and Walter H. Barinoff has been made chief cost and methods accountant.

Ford Made Vice President And Director of Jerguson

James A. Ford, sales manager of Jerguson Gage & Valve Co., Somerville, Mass., was elected vice president and director at a recent meeting of the board of directors. Ford came to Jerguson as sales manager in 1945 after long experience in the field on instrumentation and controls.

B S & B Buys Climax Controls Division

W. A. Oberholtzer, general manager, Black, Sivalls & Bryson, Inc., has announced the purchase of all of the assets of the company formerly known as Climax Engineering Co., Controls Division. The business will be continued under the official name of Black, Sivalls & Bryson, Inc., Climax Controls Division.

There will be no changes in personnel, and the products distributed by Climax in the past will continue to be manufactured at Tulsa.

Demco Opens Export Office; Names Jack Askins Manager

Drilling Equipment Manufacturing Co., of Oklahoma City, has announced the opening of export offices in New York City. This office, under the direction of Jack W. Askins, will handle all phases of export sales of Demco equipment.

Askins has a wide and varied experience in domestic oil fields, and for the past 14 years has been associated with the export phase of oil-equipment sales.

Chaplin Fulton Moves to New Neville Island Plant

Chaplin Fulton Manufacturing Co., Pittsburgh, manufacturer of gas pressure regulators, has recently occupied this new plant with 35,000 sq. ft. of floor space. located on Neville Island, 9 miles down the Ohio River from Pittsburgh.

Anode Engineering Co. Organized at Tulsa

W. F. STEWART

The principal service of the newly organized Anode Engineering Co., Tulsa, is the installation of magnesium and other types of expendable anodes for the control of corrosion on pipe lines, tank bottoms, and other types of buried metal. Three partners in the firm are: M. W. Franks, field superintendent; W. Fred Stewart, chief engineer; and W. E. DeWitt, Jr. Anode Engineering has the facilities to meet the latest engineering practices for the installation of cathodic protection.

Stewart is a 1934 graduate of Oklahoma A. & M. College mechanical engineering school. Past oil-field experience was with Oil Country Specialties Co., Lee C. Moore Co., Tulsa Boiler & Machine Co., and Walter O'Bannon Co.

M. W. Franks was formerly with Unit Rig & Equipment Co. W. E. DeWitt, Jr., operates DeWitt Co., building contractors of Tulsa.

New Houston Firm Features Oil Tool Development

John E. Eckel and Marvin R. Jones have announced the organization of Petroleum Mechanical Development Co., with offices at 3803 South Main Street, Houston. The new company will specialize in oil-tool development and consulting practice in petroleum mechanical engineering.

Eckel is a graduate petroleum and mechanical engineer and Jones is a graduate mechanical engineer.

Northern Equipment Co. and Vulcan Combine Advertising

Don Allshouse, since 1928 advertising manager for Northern Equipment Co., Erie, Pa., manufacturers of Copes boiler feed-water regulators and allied equipment, has also been named advertising manager for Vulcan Soot Blower Corp., Dubois, Pa.

A consolidated advertising department for these two divisions of Continental Foundry & Machine Co. will be maintained at Erie.

Shock Elected President of Geophysical Society

Lorenz Shock, party chief for National Geophysical Co., Dallas, has been elected president of the Permian Basin Geophysical Society. Shock, a graduate of University of Oklahoma, is a member of Society of Exploration Geophysicists, and American Association of Petroleum Geologists.

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CALENDAR

February

Southern Gas Association, meter and regulator conference, Houston, February 9-10.

American Institute of Mining and Metallurgical Engineers, annual meeting, Hotel Statler, New York, February 12-16.

Western Petroleum Refiners Association, regional technical meeting, Washington-Youree Hotel, Shreveport, February 24.

American Institute of Chemical Engineers, regional meeting, Houston, February 26-March 1.

American Society for Testing Materials, spring meeting, Hotel William Penn, Pittsburgh, February 27-March 3.

March

American Petroleum Institute, Division of Production, Southwestern District meeting, Adolphus Hotel, Dallas, March 8-10.

Indiana Independent Petroleum Association, spring convention, Hotel Severin, Indianapolis, March 9-10.

North Texas Oil and Gas Association, Kemp Hotel, Wichita Falls, March 25.

Southern Gas Association, Galveston, Tex., March 27-29.

Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, March 27-29.

American Petroleum Institute, Division of Production, Mid-Continent district meeting, Skirvin Hotel, Oklahoma City, March 29-31.

April

National Association of Corrosion Engineers, annual conference, Jefferson Hotel, St. Louis, Mo., April 4-7.

American Society of Mechanical Engineers, Hotel Statler, Washington, D. C., April 10-14.

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla., April 11-13.

National Petroleum Association, Hotel Cleveland, Cleveland, Ohio, April 12-14.

American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Gladstone Hotel, Casper, Wyo., April 13-14.

Natural Gasoline Association of America, annual convention, Texas Hotel, Fort Worth, April 24-26.

Oil Heat Institute of America and National Oil Heat Exposition, annual meeting, Commercial Museum, Philadelphia, April 24-May 1.

American Petroleum Institute, Division of Production, eastern district meeting, Cleveland Hotel, Cleveland, April 26-28.

May

American Petroleum Institute, Division of Refining, midyear meeting, Hotel Cleveland, Cleveland, May 1-4.

Interstate Oil Compact Commission, spring meeting, Biloxi, Miss., May 4-6.

Independent Petroleum Association of America, midyear meeting, Biltmore Hotel, Los Angeles, May 7-9.

National Stripper Well Association, Biltmore Hotel, Los Angeles, May 7-9.

American Gas Association, Natural Gas Department, spring meeting, Mayo Hotel, Tulsa, May 8-9.

Liquefied Petroleum Gas Association, annual convention, Palmer House, Chicago, May 9-11.

American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles, May 11-12.

American Gas Association, production and chemical conference, Hotel New Yorker, New York, May 22-24.

American Institute of Chemical Engineers, regional meeting, New Ocean House, Swampscott, Mass., May 28-31.

June

National Oil Scouts and Landmen's Association, Skirvin Tower Hotel, Oklahoma City, June 8-10.

American Society of Mechanical Engineers, oil and gas power division, Lord Baltimore Hotel, Baltimore, June 12-16.

Pennsylvania Grade Crude Oil Association, Hotel William Penn, Pittsburgh, Pa., June 15-16.

American Society of Mechanical Engineers, Hotel Statler, St. Louis, June 19-23.

Canadian Gas Association, annual convention, Manior Richelieu Hotel, Murray, Quebec, Canada, June 20-24.

American Society for Testing Materials, annual meeting Chalfonte-Haddon Hall, Atlantic City, N. J., June 26-30.

American Petroleum Institute, midyear division of production and standardization conference, Brown Palace Hotel, Denver, June 26-30.

August

Interstate Oil Compact Commission, summer meeting, French Lick, Ind., August 3-5.

September

American Society of Mechanical Engineers and Instrument Society of America, Municipal Auditorium, Buffalo, N. Y., September 11-15.

National Petroleum Association, Hotel Traymore, Atlantic City, N. J., September 13-15.

American Society of Mechanical Engineers, petroleum mechanical engineering conference, Roosevelt Hotel, New Orleans, September 25-27.

October

American Gas Association, annual convention, Atlantic City, N. J., October 2-6.

Mid-Continent Oil and Gas Association, Texas division, Dallas, October 4-5.

American Association of Oilwell Drilling Contractors, annual meeting Mayo Hotel, Tulsa, October 9-10.

November

American Petroleum Institute, annual meeting, Biltmore and Ambassador Hotels, Los Angeles, November 13-16.

American Society of Mechanical Engineers, Hotel Statler, New York, November 26-December 1.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas Nomads, first Monday of each month, Texas Room, Baker Hotel.

Houston Nomads, second Monday of each month, Ye Ole College Inn Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

Proposals for Gas Service To South are Continued

A hearing originally scheduled to reconvene February 6 on applications of Atlantic Gulf Gas Co., Southern Natural Gas Co., and United Gas Pipe Line Co., to serve Georgia, Florida, South Carolina, and Alabama, with natural gas, has been continued indefinitely.

Both Southern Natural and Atlantic Gulf are proposing to construct facilities designed to serve areas, some of which are substantially the same, in four southern states, while United Gas is seeking authorization to build a line for delivery of natural gas to Atlantic Gulf.

BRANDS *are important!*

Cattle are branded primarily to prove ownership.
But, experienced cattlemen and livestock buyers know that
some brands are always found on higher quality animals.
These brands come from better feed and water,
from better breeding stock, from better handling.
The HAZARD brand on a reel of wire rope is your assurance of quality—
quality backed by wire rope manufacturing experience
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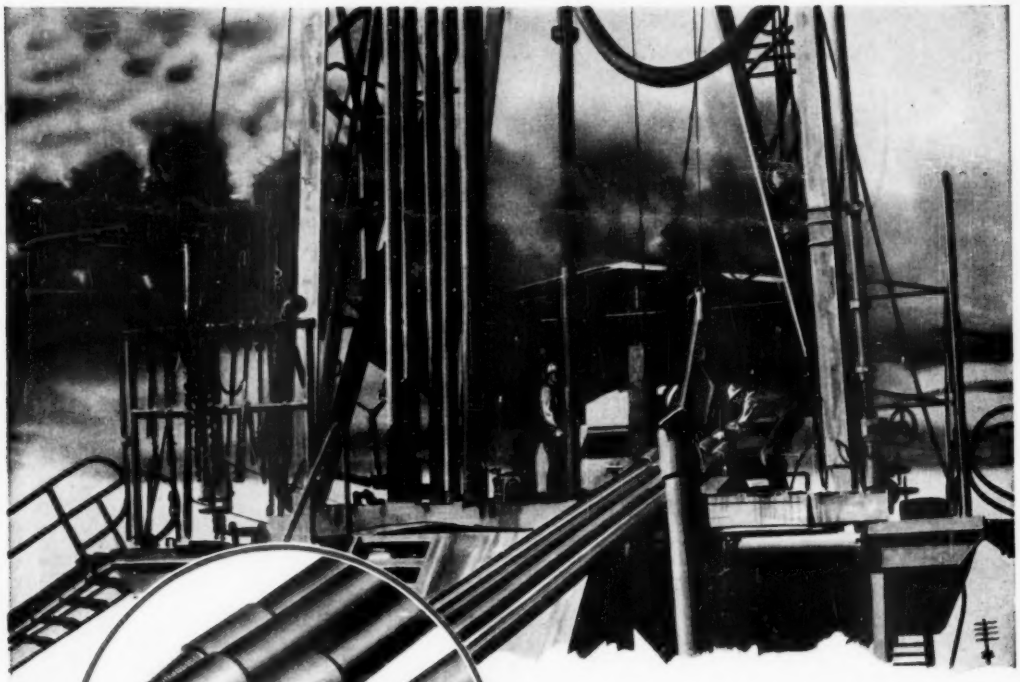
AMERICAN CHAIN & CABLE
HAZARD WIRE ROPE DIVISION

THADE MARK

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, Odessa, Tex., Pittsburgh, San Francisco, Bridgeport, Conn.



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HUGHES SEAL GRIP TOOL JOINTS

Hughes Seal Grip Tool Joints . . . designed for maximum strength, safety, and complete utility as to field replacement . . . may be installed, removed, and replaced anywhere. A dependable seal at both ends of the Seal Grip thread provides:

1. Protection from corrosion for pipe and tool joints.
2. Added strength resulting from longer engagement.

The Seal Grip pipe end threads have shallow depth, coarse pitch, and steep taper. These features provide the following advantages:

1. Shallow depth threads permit the use of a minimum of the available section of pipe and tool joint for thread.
2. Coarse pitch threads are rugged and less susceptible to damage in installation and handling.
3. Steep taper permits a thicker tool joint section at the end of the pipe, providing a greater strength where the greatest loads occur.
4. Shallow depth, coarse pitch, and steep taper contribute to the reduction in the number of make-up turns required to assemble.

This is another Hughes "Engineered Solution."

HUGHES TOOL COMPANY

HOUSTON, TEXAS

Standard of the Industry®

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ON

ROLL 3